THE J. F. C.
HARRISON
COLLECTION OF
NINETEENTH CENTURY
BRITISH SOCIAL HISTORY

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vol.1
no.1-11
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J. F. C. Harrison

LOCOMOTIVE ENGINEERS AND FIREMEN'S
Monthly Journal.

"This that they call Organization of Labour is the universal vital problem of the world. It is the problem of the whole future for all who will in future pretend to govern men."—THOMAS CARLYLE.

"I know no better definition of the rights of man:—Thou shalt not steal; Thou shalt not be stolen from; what a society were that—PLATO'S REPUBLIC, MORE'S UTOPIA, *mere emblems of it! Give every man what is his—the accurate price of what he has done and been—no more shall any complain, neither shall the earth suffer any more."*—THOMAS CARLYLE.

VOL. 1. FEBRUARY, 1888. NO. 1.

BY MANY of the members of the Associated Society of Locomotive Engineers and Firemen, a desire has been expressed that there should be a medium of communication between the members of the Society and locomotive engineers and firemen in general, whereby they might exchange opinions on the different questions in which they as a body of responsible workmen are directly interested, and also with a view to their consolidation as a body for the purpose of improving their position. Up to the present time the public are almost entirely ignorant of the responsibilities, difficulties, and *hardships* of the driver of the locomotive behind which they ride on their journeys to different parts of the country, whether for business or pleasure.

And yet it is to this branch of the railway service that the public have in a great measure to depend for the safe and quick means of being conveyed on their long journeys, both passengers and merchandise. There are a great many people who have no idea of the magnitude of the railway system in Great Britain. In Great Britain there is over 19,000 miles of railway open for traffic. To work this vast system there is about 350,000 railway servants, over half that number being employed in the direct working of the traffic—passenger, goods, and mineral. For the conveyance of passengers there are 33,000 passenger carriages; for the conveyance of goods, mineral, and miscellaneous traffic (not including private owners' wagons) there are nearly 500,000 wagons.

The total number of passengers carried yearly amounts to nearly 695,000,000, and the income from that source amounts to £30,000,000.

75,000,000 tons of goods, and over 180,000,000 tons of mineral traffic are carried yearly, bringing in an income of £37,500,000; and miscellaneous traffic, bringing in about £2,500,000; or a total income from all sources of £70,000,000 per year.

The total working expenses amount to £37,000,000 per year, leaving a profit, after paying all working expenses, of £33,000,000.

The number of miles run by passenger trains reaches 143,000,000 miles. The number of miles run by goods, mineral, and miscellaneous trains reaches 129,600,000 miles, or a grand total of 272,600,000 miles per year. To convey this large number of passengers, and this large amount of goods and mineral traffic, there are over 15,000 locomotive engines, requiring over 30,000 engine drivers and firemen to work them, and the figures shew what a great responsibility rests on the locomotive staff.

The object in issuing this *Journal* is to open up a means of communication between locomotive enginemen and firemen and the public, and its columns will be open to any contributor, providing he keeps from personalities and matter that is likely to provoke animosity.

The *American Brotherhood of Locomotive Engineers' Journal* brings in profits to that association amounting to 7,000 dollars per year.

It is conducted entirely by their own members. Letters shewing the progress of the various branches, and articles of information on Society and other matters of general interest to the members and the public, are contributed by members of the Association; and it is very gratifying to see that many of the meetings of the Association are patronised by the presence of some of the highest officials in the management of the locomotive department, shewing there is no friction between the employers and their employés who are members of the Association.

This is a feeling between employers and employed that ought to exist, and we hope does exist between the members of the Associated Society of Locomotive Engineers and Firemen, and the various locomotive superintendents in this country, and if such a mutual understanding does not exist, it will certainly not be the fault of the working staff. The responsibilities of the locomotive engineer are very great, for he has to work trains at a high rate of speed in all kinds of weather, and as he has to calculate by his own judgment the time and distance it will take to bring his train to rest, it is very often the cause of very great anxiety to him, he being held entirely responsible for stopping either at station or signal, and should he by a miscalculation overrun the mark, the whole blame is cast on him.

In foggy weather, the strain on the engineer is very great, for he has, in spite of fog or frost, rain or snow, to strain his eyes through the atmosphere, to get the earliest glimpse possible of the signals he has to work to.

How many of the passengers think of the engineer when they get into the train to commence a long journey by the fast express, when the cold cutting sleety rain is falling so fast and sharp as to almost cut through the skin when it strikes on the cheek, or the snow is falling so fast as to almost obscure the vision, or the fog is so dense one is unable to see across a street of reasonable width, or the wind blowing such a hurricane as to make it almost impossible to keep on the feet, yet, in spite of all, the engineer must not shirk his duty—no, he must remain at his post on the footplate with little or no shelter from the fury of the elements, and must in spite of all obstacles pilot his train with safety to its destination.

A great many heart-searching stories could be told of engine drivers who have displayed great heroism and courage in the face of very great danger, risking their own lives in order to save the train of passengers in their charge from destruction.

With the hope that the *Journal* may prove a source of interest and also a benefit to the Association, we circulate our first issue, and we cordially invite any member to send contributions of interest and information for insertion, asking them not to bring forward any personal grievances, as the proper way to get grievances redressed is through the medium of the Society—not the *Journal*. Hoping it may prove a source of interest and information to the members and the public, we wish it long life and prosperity.

EMPLOYER & EMPLOYED.

When rightly considered, the interests of employer and employed are identical. In the first place both make their living out of the same business or undertaking. The Railway Company furnishes track, road, bed, engines, &c.; the employees furnish the labour by which this system or business is operated. All are interested in the profits. The employee gets his wages from this source, and the employer or the Railway Company gets the balance. In fact, any business is a partnership to a certain extent. The employer puts in the capital, the employee furnishes the labour. Out of the result of this combination both are paid. From this reasoning, it necessarily follows that any harm done to capital injures labour, and any harm done to labour injures capital.

As society is now constituted, capital is largely in the hands of one class and labour in the hands of another; in some instances these classes may disagree, or the one may attempt to coerce the other to certain obnoxious measures, but in either case injury results to both.

Take a strike for an instance—capital and labour cannot agree upon the amount of wages to be paid for certain work; capital offers so much: labour wants more; production ceases; whose loss is this? It is the loss of both capital and labour; capital loses its profits, interests on its investments, and the useless deterioration of its machinery; labour loses its wages, nay, more than all this, the whole world loses because there is less wealth produced. One of the great objects of our organisation is to prevent unnecessary clashes between employer and employed. One of our fundamental doctrines is that labour and capital are brothers, with hand in hand they march along the highway of progress, and it is wrong and suicidal to put them at enmity; with our intricate system of civilization it is next to impossible to prevent some differences to creep in between capital and labour; if, however, these differences are honest, they should be adjusted peaceably and honourably. Both sides ought to give and take. Capital should extend its hand to labour, and labour should grasp it in a friendly manner.

There should be no insulting demand on one side, nor insulting difference on the other.

This truth should be impressed upon all men,—capital depends upon labour, and labour depends upon capital.

Very few people stop to think about the real relations of employer and employed. Many have the conception that employers ought to pay as little as possible for labour, and labour perform as little as possible for its wages. This is all wrong. The successful outcome of the business engaged in is in the interest of all.

Some have gone so far as to say that there is a natural, a necessary conflict between labour and capital. These are very shallow thinkers, or else very great demagogues.

To see the proper relation between labour and capital and to teach that relation is one of our objects, and we desire our employers to fully understand that we are organised for no purpose harmful to their interests, but on the contrary we seek to make the relations between us and them pleasant, profitable, and mutually beneficial in all respects. We hope railway officials will second our efforts and shew to their employers that their welfare and that of the men who labour for them are identical. A harsh unsympathetic employer obtains only half-hearted service. An employer with a heart gets good service with respect thrown in. If differences arise, as they often will, both sides should be above all things manly, no cringing on the one side, nor arrogance on the other. In the first place the difference should be real or cease to exist; in the next place both sides should be willing to compromise. An employer should bear in mind that to make arbitrary rules or cut down wages, without cause, is as much of a "strike" as one indulged in by labourers who "strike" for higher wages. To "strike" is simply to demand something that is not given willingly. When as an organisation we say to our members "do not 'strike,'" we say at the same time to our employers "treat us fairly"; if the difference is great let us confer about the matter, let us both understand the situation fully. All are men and should be treated as such. If this feeling is carried out faithfully no great disturbances need arise. Wisdom is our best counsel always, and to compromise is wisdom. Again we repeat, capital and labour should not be antagonistic to each other. There is no natural conflict between them, together they make a noble combination, capable of subduing the world to the full use of man.

All the enginery, all the cities, all the great highways, all the inventions of this century have their life and progress as the result of combined capital and labour; why then should these brothers quarrel? False friends and bitter foes may cause differences, but they should be for ever united. One of the great drawbacks to a complete understanding of the true relations between capital and labour, springs from ignorance, and it is our duty as an organisation to educate our members to a correct understanding of their relations to their employers. This duty we are striving to perform. This ignorance of the proper relations between capital and labour is not confined to the ranks of the employed.

Some of our employers are woefully ignorant on the subject, they have learned to look only at immediate results and have failed to see the situation from a high point of view, whilst others who understand the true relations between employers and employed listen with respect to the demands of the employed, and afford relief if they can, or a reason why if they cannot.

We desire it to be known that we deprecate violent differences between employer and employed; that we encourage honourable settlements in all cases, and if our employers will meet us half-way, they will always find us ready to agree to anything that is fair and honourable. We believe in capital and labour, not in capital against labour.

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THE POWER OF THE LABOUR ELEMENT.

If there were no other indications of the growing importance of the labouring classes, the constant efforts of politicians to conciliate and befriend labouring men would be evidence sufficient.

This importance of the labour element grows just as fast as grows education. Teach a man what his power is and where he belongs, and it will not take him long to resolve to use the power to place himself where he belongs.

Politicians as a class are keen-witted and far-seeing. They have found out long ago that which labouring men as a class have not yet fully realized, namely, that organized labour is destined to rule the nation.

It is simply a question of organization. The power is there, and all that is needed is the proper appliance of the power. The anxiety of political parties to have the labouring men on their respective sides ought to teach every labouring man his individual importance. What political party can be successful in this country without the labour vote? None. Think of the power, then, labour already has.

The great problem of the future is, how shall labour be organized? What will be the proper objects of such organization? It will take great effort to effect such organization, and great wisdom and self-control to carry out its objects.

Think of these things, men of labour! The future has much thought, much anxiety in store for us, but it holds also the promise of great power and great elevation. If politicians recognise our importance, we should not be slow to recognise it also. We are rapidly advancing to the condition when a simple demand on our part will meet with ready compliance. We must meanwhile educate ourselves to demand only that which is right, and to make that demand so unmistakably that refusal to comply therewith will not be thought of.

Labouring men must learn to occupy the highest plane of right and justice. Foolish demands defeat themselves. Justice wins at the last. At the bottom of everything lies education. Learn what is right. Organize to do it.

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BE INDEPENDENT.

There is nothing in the wide world that insures success so completely as does perfect independence. People who are always waiting for help may wait a long time as a general thing. A little assistance, a little influence, is not to be had for asking, but there is always something one can do for himself. Do it, whatever it is, with a will. One thing leads to another. If a young lady, don't sit still and hope a rich young man will marry you, while your aged father toils for your daily bread. Learn how to help yourself, and take care of yourself as much as possible. Rather be one who does things for others, than one who must have things done for you. Two hands, two feet, sight and strength—these ought to enable you to dispense with help while you are young and vigorous. Men who can defy adverse circumstances, and can earn a living in any quarter of the world in which they are dropped down; who can roll up their sleeves and set to work at almost anything that offers, and who can even sew on their own buttons, and make themselves a cup of tea when deprived of the help of womankind, are ones who are really independent. The most helpful women are the kindest and the truest; and as for man, never trust him in any capacity if he has not within him the true spirit of independence, without which neither strength nor sweetness may be hoped for. In the battle of life there is but one way to succeed—fight it out yourself. Give the helping hand when you may. Take it, if in some sore strait it is offered freely; but never ask for it. Be independent as far as can be if you would honour yourself, or be honoured by others, or be happy.

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CHARITY VS. MALICE.

Our members must learn that they are in honour bound to protect the character and standing of all other members of the Order. As long as a member commits no offence by which he violates his obligation, no member has a right to detract from his reputation. If he proves false to his pledge, prompt and decisive action should be taken against him as the constitution provides, and he should be made to atone for his wrong. But as long as he holds his place in the Order he is entitled to the respectful consideration of every member. It is too often the case that members say unkind, uncharitable, and unjust things of each other, and these remarks in many instances are prompted by envy, jealousy, and malice.

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AMBULANCE WORK.

"And is he dead?" "Yes, he died from loss of blood. Eight or nine of us were present at the time the accident occurred, but not one of us knew how to arrest the bleeding, otherwise his life would very probably have been saved. In fact, that is the doctor's opinion." Such were the remarks that fell from the lips of a fellow-workman of mine, who had been giving an account of an accident that had befallen an old comrade, whose legs had been run over by an engine, and who had died from loss of blood before medical assistance could be obtained. But I can almost imagine hearing some of my fellow-members saying, well, there is nothing very remarkable about the occurrence you have alluded to, for most railway men have heard of many similar cases. That it is not an uncommon occurrence, I admit, but is it not a fearful and heartrending scene, when a group of men have to stand around an injured mate, whose life's blood is fast spurting out, and to see death rapidly approaching, and not one of them possessed of sufficient knowledge to avert the evil? And, no doubt, those of you who have been present under similar circumstances, felt that you would have willingly given all you possessed to have saved the lives of those comrades whose eyes you saw close in death, as you stood by powerless to assist them. And yet it is just possible that by a trifling sacrifice on your part, you may gain sufficient knowledge to enable you to render such assistance to an injured brother as will save his life, and if not called upon to take part in a case of such a serious nature as that, you may be the means of preventing a great deal of human suffering in connection with the numerous accidents to which railway men are liable. But in order that you may be the better able to render such assistance, it is necessary that you should know something of the structure of that wonderful piece of mechanism, the human body, also the manner of applying bandages, splints, tourniquets, &c., and I am not acquainted with any other way by which an engine driver or fireman can so readily acquire that knowledge as in an Ambulance Class in connection with the S. John's Ambulance Association. This association was established in 1877, for the purpose of spreading sufficient knowledge among all classes of society, to enable them to give immediate help in cases of injury and sudden illness, and although every engineman and fireman who may be present at the time an accident occurs may be prompted, by the ordinary feelings of humanity, to give what assistance they can under the circumstances, it very often happens, as I have made an attempt to shew, that on account of pure ignorance they are unable to bestow any help. Others, again, who are more confident in their own powers, but equally uninformed, try to render assistance, and in consequence of their want of skill or rough handling, cause increased suffering to those injured, and may even endanger their lives. Now, this association aims at doing away with this ignorance by shewing all who are willing to accept of their teaching, how they may render help to those who are injured. until medical assistance arrives. The course of instruction required is not difficult to understand, only five lectures delivered at intervals of a week being required to convey the necessary information. These five lectures are generally given by a local surgeon, and consist of a description of the bones, the muscular and nervous systems, the circulation of the blood, the blood vessels, the different kinds of bleeding (of which there are three), how to distinguish and how to stop them, fractures and how to treat them, &c., &c., and an observant engineman or fireman would quickly perceive the striking analogy that exists between the human body and the iron horse, which would, no doubt, make the lectures doubly interesting to them. Interesting and valuable information is also given how to treat the apparently drowned, people who have taken poison, persons found hanging, methods of lifting and carrying the injured, &c., each lecture being followed by half an hour's practice in applying bandages, splints, and tourniquets, and in stretcher exercises. When the lectures are completed, an officer is sent down by the association, and the men are examined, and the successful candidates presented with a certificate. After an interval of a year, those who hold certificates are re-examined, and after another twelve months have elapsed they are examined for the last time, when each successful candidate is presented with a bronze medallion, with his name and number on the back. But, of course, the lectures will be of but little use unless they meet frequently together for practice in the application of bandages, splints, &c., and in stretcher exercises. I will now picture an imaginary accident or two, and try to shew how useful enginemen and firemen might be one toward another, should an accident befall them, or to a guard, a shunter, or the travelling public. We will first suppose that a fireman has fallen from the tender top on to the metals, and a thigh is broken; now, as the accident may have occurred in the night, and at a water crane, it is just possible that medical assistance cannot be readily obtained, for some water cranes that I could mention are fixed in rather isolated situations; that being the case, the driver and guard lift the injured fireman on to the engine footplate, but whilst they are doing this, the man is crying out with pain. Now, let us see what they may possibly have done; but in order that I may explain it to you more clearly, you must understand that fractures or broken bones are divided into four classes: first, simple fracture or simple break; second, compound fracture or the broken ends of the bone communicating with a flesh wound; third, complicated fracture or injuries to soft parts, blood vessels, nerves, joints, or internal organs; fourth, it is not here necessary to give. Now, although the fracture might at first be a simple one, the fact of the man being shifted without the leg being supported, would render the broken ends of the bone liable to be pushed through the skin, thus making the fracture a compound one, or if the broken ends of the bone did not actually go through the skin, they might tear open a large blood-vessel, or wound an important nerve, thus making a complicated fracture. Now, I am given to understand that an ordinary case of simple fracture of the thigh can be generally treated successfully, but if compound or complicated, the injured man is in danger of losing either his limb or his life, or both, for according to an eminent surgical authority, amputation for injuries to the thigh bone is one of the most fatal operations in surgery, so that you will readily perceive the unnecessary pain and real danger to which the injured man has been exposed by men who, although anxious to do their best, were ignorant of the serious nature of the man's injuries, or the manner in which a fractured thigh bone can be detected. But I will now suppose that the engineman had passed his ambulance examination; that being so, he would not have attempted to shift his mate (unless he was in danger from passing trains), until he had satisfied himself as to the extent of the man's injuries, and as there are various symptoms by which fractures are known, he would soon perceive that the thigh was broken ; for instance, there would be pain and loss of power, and shortening of the limb. The foot would be turned outward, and if the limb was moved about a little, a peculiar grating would be heard, by the broken ends of the bone rubbing against each other, and by placing one of his hands over the seat of the injury the broken ends would be felt. He would then have applied a long splint on the outside of the injured limb, from the armpit to the heel, and a shorter one on the inner side of the thigh, from the top of the thigh to the knee; while he was fixing the splints, the guard could gently pull the injured limb down until the feet were level, both legs would be then tied together and the man might be safely lifted without fear of the ends of the bone doing any further injury, and probably the man's limb, or possibly his life might be saved, by reason of the driver having the knowledge how to render first aid. Again, I will suppose that an engine driver is oiling his engine, and in stepping off the outside rod or framing, as the case may be, he falls in front of an approaching train, and before he can recover himself, the engine and waggons have passed over one of his legs. Now, like the fireman I alluded to, the accident may take place where medical assistance cannot readily be obtained, and I think most people know that if a main artery is severed and the bleeding is not arrested, that death will only be a question of a few minutes, and is the poor fellow to bleed to death then, because medical assistance is not at hand ? No, his fireman has passed through a course of instruction, and knows where all the main arteries are situated, and at once applies pressure (by means of his thumbs) on the femoral or main artery of the thigh, but so much force would be required in pressing the artery against the thigh bone, that he would soon be tired, but the guard or some other servant may have arrived by this time, and he instructs him to make an improvised tourniquet by means of a pad, or stone, a handkerchief, and a piece of stick; he then removes his thumbs, and applies the pad instead, and then twists the handkerchief by means of the piece of stick until sufficient pressure is obtained to stop the bleeding, until the arrival of professional assistance, and probably saves his mate's life. Now, fellow members, do you think either a driver or fireman would begrudge the time they devoted to ambulance practice in order to be of such service as I have pictured ? I think you will admit they would not. But it may be said that enginemen and firemen are not often overtaken by such misfortunes as I have alluded to, or that I have considerably overdrawn my pictures, but similar accidents to those I have pourtrayed have actually taken place within my railway experience, and are continually occurring, for in 1886 no fewer than eight enginemen were killed, and one hundred and forty-three injured; also eighteen firemen killed, and one hundred and ninety-five injured, so that a great deal of unnecessary pain may be prevented by you acquiring the knowledge how accidents should be treated, and once possessed of the knowledge how to render first aid, you would be ready for any emergency, and although I might have given a more detailed account of the treatment necessary in the supposed accidents to which I have referred, I trust that enough has been written for my purpose, viz.: to cause a more lively interest to be taken in ambulance work than at present exists amongst enginemen and firemen, and I trust that through the medium of our society journal, we may be enabled to push on this good work, and that the time is not far distant when classes will be established at all our branches, feeling confident from my experience as secretary of a class at Nottingham, that they would be productive of much good, for, were our members brought into closer communion with each other by engaging in a work of this kind, it would have a tendency to more firmly seal the bond of friendship that exists between every true member of our society. It should also be an inducement for non-members to join our ranks, for if we are true to our profession, and not brothers in unity for mutual help in name only, but in word and deed, and let them see that perfect harmony exists in our midst, as it ought to, if we have the interest of our cause at heart, then most assuredly we shall win hundreds of them to our side. Of course, I do not for a moment suppose but we have many in our ranks already engaged in ambulance work, and to them I would say: do not criticise my epistle too keenly, but let us have an interchange of ideas through the medium of our journal, upon the best means to be adopted in those cases of accident to which enginemen and firemen are most liable, and by so doing we shall refresh our memories, and feel more fully equipped in case of emergency; and to those who have not already begun to take an interest in this work, do so at once, for by so doing you may possibly be the means of saving the life of some near and dear friend. I may say, in conclusion, that the class at Nottingham consisted of upwards of seventy members, many of whom have been called upon to render assistance to injured persons, and a driver and his mate have the satisfaction of knowing, from medical testimony that they were instrumental in saving the life of a fellow-workman who had been run over by some wagons, and who lost an arm in consequence, and but for their timely assistance, would have bled to death. Any information I may be able to impart in reference to the forming and working of the class to which I have referred, I shall be only too happy to give through the pages of our journal.

I am, fellow members,
Yours fraternally,
Thomas Ball.

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THE IRON HORSE.

The iron horse, like its master, is liable to serious indisposition, subject to strains and ruptures, and is sometimes nearly choked. Now and again, therefore, it is not very lively, and consequently requires extra supervision. It is undeniable that break-downs and failures of every possible description, like everything else, have their cause or their origin within reach of investigation.

Every failure of an engine is one of three things: it is either a deviation from what the builder intended, a deviation from perfect enginemanship, or a deviation from sound genuine locomotive properties. It is clear we cannot tell what the deviation, the something wrong is, unless we know what the thing deviated from, the prior something right, was, which can only be ascertained by observation and experience.

Observation in a shed may appear to some persons very tame and unphilosophical; but by it alone some worthy individuals have discovered the cause of certain effects which others have deemed unknown or unassignable.

He who resolves never to investigate the cause of any other failure than his own, must remain all his life unfit to govern a powerful engine coupled to an express train.

There can be no doubt that he who has made the most of his time, and made the most investigations, is best qualified to take charge of the most important trains. The excellences of our calling are not arrived at by chance, but a man must begin with the conviction that he is in his proper sphere, a sphere suitable to his abilities. With both hands and a buoyant will he must buckle to, resolved to know all about the engine; all about the laws of combustion, the fire, water, and steam; all about failures, choked fires, priming, and the quality of coal.

Every object exhibited to view upon the line may furnish matter for investigation. Even when standing by a water crane, the position of some portion of the engine in relation to the column or dip of the crane can be taken; for ever after the information gained may be really valuable. The same thing may be said of the turn-table; and such notes, although seemingly trifles in themselves, very often enable a man to exhibit tact and skill.

But whilst diligence is strongly recommended to the young driver, who frequently has no other means of gleaning facts,—for few men will make him as wise as themselves—yet there are certain things which take place about an engine that require years for their solution. No doubt some persons are trying to solve them now and have been trying for years.

They may have obtained the solution of a few problems, which are to them "chance pearls which diligence loveth to gather and hang around the neck of memory." To such persons be it known that self-reliance is a grand element of character; it has won Olympic crowns, and Isthmian laurels; it confers kinship with men who have vindicated their divine right to be held in the world's memory.

Let the master passion of the soul evoke undaunted energy in pursuit of the attainment of one end, aiming at the highest, in the spirit of the lowest, prompted by the turning thought of reward, which sooner or later will come, for earnestness and foresight are steeds which never fail. This is a beautiful Persian proverb: "A stone that is fit for the wall shall not be left in the way." If you are fit for the wall, heed not. Only, be fit, squared, polished. Learn such knowledge as is necessary and falls within your sphere, and it is certain your turn will come. The builders will find you, the wall will require your services to fill up a place quite as much as you need a place to fill.

REYNOLDS.

COMRADES, BE HONOURABLE.

Many young men start out in life with the idea that one's success depends on one's sharpness. They imagine if a man is able to get the best of a bargain, no matter by what deceit or meanness, he carries his point, that is, prosperity. Such is a great mistake. Enduring prosperity cannot be founded on cunning and dishonesty. The crafty and deceitful man is sure to fall a victim sooner or later to the influences which are for ever working against him; his house is built upon the sand, and the foundations are sure to give way. Comrades, we cannot give these truths too much weight, our future is safe if we avoid double dealing, both from ourselves and our employers. Our Society was established to put down tyranny, and uphold the enduring principles of justice, morality, truth, and industry.

MEMBER OF NO. 5 BRANCH.

For pleasure or pain, or for weal or for woe,
'Tis the law of our being—we reap what we sow;
We may try to evade them, may do what we will,
But our acts, like our shadows, will follow us still.

NORTH EASTERN RAILWAY SERVANTS.

A meeting of delegates of North-Eastern Railway servants has just been held, to organise a movement to increase wages and regulate hours. A programme of what the men require has been sent out to be considered in all the North-Eastern Railway leading districts, and it is sought to get the men to endorse this programme, and send representatives to a conference to be held, it is expected, at Newcastle-on-Tyne, where a deputation will be appointed to press the changes on the directors at York. The action now being taken is on the part of the engine-drivers, firemen, goods guards, mineral guards, and signalmen. The claims vary in the different classes of labour and between different workmen in the same department, some not having received, it is stated, equal wages with others, as arranged four or five years since. The claims will amount to 20 per cent. in some cases, when the question of hours as well as actual wages is taken into account. In others the advance will not be more than half that figure, if so much. The increase of railway traffics stimulate the men's action, combined with improvement of trade.

The following is a statement of the claims which will be submitted for consideration:—

Programme of the engine-drivers, firemen, goods guards, mineral guards, and signalmen.—Respectfully presented to the Board of Directors and Superintendents of the North-Eastern Railway Company:—Engine-drivers to commence at 5s. per day; after six months, 5s. 6d.; after one year, 5s. 9d.; third year, 6s.; fourth year, 6s. 3d.; fifth, 6s. 6d.; sixth, 6s. 9d.; seventh, 7s.; express drivers, 7s. 6d. per day.

Firemen to commence at 3s. per day; after six months, 3s. 4d.; after one year, 3s. 6d.; third year, 3s. 9d.; fourth year, 4s.; fifth year, 4s. 2d.; sixth year, 4s. 4d.; seventh year, 4s. 6d. In cases where firemen are required to fire for over twelve years, 4s. 9d. per day.

Ten hours to constitute a day in all cases. All time worked in excess of ten hours each day to be paid at time and quarter.

Sunday work to be paid as at present.

Signalmen's grievances will be considered at the meetings.

Goods guards to commence at 25s. per week, and be advanced 1s. per week per year until 30s. per week is attained.

Shunters to commence at 21s. per week, and rise 1s. per week per year until they rise to 25s. per week.

Mineral guards to commence at 23s. per week, and be advanced 1s. per year until 27s. per week is attained.

Each day to stand by itself. All time over ten hours to be paid at time and quarter

Sunday time to be paid at time and quarter.

In conclusion, your employees desire that you will kindly consider their responsible, arduous, and dangerous duties, and that you will grant the requests contained in the above programme, and to prevent dispute we desire that printed copies of all working arrangements made between you and ourselves shall be placed by each department in a position (on the company's premises) where it can be seen when required, so that no alteration may take place except by the consent of the Board of Directors, general manager, or superintendents, and a committee of ourselves.

Should you have the beneficence to grant our requests, we can only add that it shall ever be our aim to do our duty to the best of our ability, and thus deserve your future approbation and confidence.

* * *

300 MILES AN HOUR.

When George Stephenson asserted his ability to run passenger coaches at a speed of 12 to 15 miles an hour, scientific and practical men deemed him fit for a lunatic asylum, but time has shewn that trains may be run at a much greater velocity without materially adding to the dangers of railway travel. The flight of the fast express on the Pennsylvania Railway is a marked example of the possibilities in the way of sustaining high rates of speed. This road now runs the fastest train in America. Nine hundred and twelve miles, including seven stops, are accomplished in 25½ hours, and the average time is 36·30 miles an hour. A portion of the distance is run at a rate of 75 miles an hour. At a speed of 60 miles an hour the driving-wheels of the locomotive on this train make 258½ revolutions a minute. William Vanderbilt's spurt of 81 miles in 61 minutes on the New York Central is declared to be the highest rate of speed ever attained in this country, but this speed was not a surprise to good engineers, many of whom are firm in the belief that 100 miles an hour will yet be accomplished on American roads.

One of the latest efforts at improvement is that of a Frenchman named Estrade, who has constructed an engine of 42 tons, with driving-wheels six in number and eight and a half feet diameter. This engine is built for high speed and will carry a pressure of 200 pounds to the square inch.

Years ago Col. Meiggs predicted air lines, walled in, with heavy tracks, all grade crossings guarded and a speed of 300 miles an hour.

◆

In Dr. B. W. Richardson's recent Cantor Lectures on "Animal Mechanics," speaking of the mechanism of the heart, he described the number of the pulsations of the heart in different animals—in fish, frog, bird, rabbit, cat, dog, sheep, horse—and made a few comments on the remarkable slowness of the heart—40 strokes per minute—in the horse. Then the number of pulsations in man at various periods of life, and at different levels, from the level of the sea up to 4,000 feet above sea level, was brought under review, and was followed by a computation of the average work performed by the heart in a healthy adult man. The work was traced out by the minute, the hour, and the day, and was shewn to equal the feat of raising 5 tons 4 cwt. one foot per hour or 125 tons in twenty-four hours. The excess of this work under alcohol in varying quantities formed a corollary to the history of the work of the heart, Parke's calculation shewing an excess of 24 foot tons from the imbibation of eight fluid ounces of alcohol. The facts relating to the work of the heart by the weight of work accomplished, was supplemented by a new calculation, in which the course of circulation was explained by mileage. Presuming that the blood was thrown out of the heart at each pulsation in the proportion of 69 strokes per minute, and at the assumed force of 9 feet, the mileage of the blood through the body might be taken at 207 yards per minute, 7 miles per hour, 168 miles per day, 61,320 miles per year, or 5,150,880 miles in a lifetime of eighty-four years. The number of beats of the heart in the same long life would reach the grand total of 2,869,776,000.

◆

Steam as compared with water occupies 1,728 times as much space. A cubic inch of water will make 1,728 cubic inches of steam at atmospheric pressure. Now if this steam is compressed into half the space it occupies at atmospheric pressure, it will then occupy only 864 cubic inches. If reduced again to half its volume it will occupy 432 cubic inches and will have 30 pounds pressure. Reduced again to half the volume the steam will occupy 216 cubic inches, and will have 60 pounds pressure to the square inch. We can go on reducing it in this way until we find that a cubic inch of water turned into steam and compressed into a space of three cubic inches will have the enormous pressure of 3,840 pounds to the square inch.

◆

As the great physiologist, Bichat, observed, many years ago, death may come at last in any one of three different ways: by failure of the heart, the lungs, or the brain. The first named is, in fact, the one that always shews that life is extinct. So long as the heart keeps going, the circulation is kept up, and all parts are nourished. When breathing ceases, no more oxygen can reach the blood, and the latter no longer nourishes any part as it should; the brain no longer sends its influence to the heart, and it has no further incentive to keep on working. If injury to the brain should happen, or some poison interfere with the outflow of nerve force, then the lungs no longer take in fresh air, and the heart ceases its work. So, finally, all modes of death result in the cessation of the heart-beats, and the life of the body stops within two or three minutes after complete failure of this great force-pump to continue its action.

AN AMUSING CHEMICAL EXPERIMENT.

Place five glasses in a row, then pour into the first a solution of potassium, the second a solution of corrosive sublimate, the third a small quantity of iodide of potassium and some oxalate of ammonium, the fourth a solution of chloride of calcium, and the fifth some sulphide of ammonium. Now pour part of the contents of the first glass to the second, and a scarlet colour will be obtained; next pour the second into the third, and the mixture will be colourless; again, pour the third into the fourth, and the contents will be white; finally, pour the fourth into the fifth, and the mass will be a dense black. Then you will have had two glasses colourless, one scarlet, one white, and one black.

◆

RAILWAY TUNNELS.

The total length of the Severn tunnel, England, is 4 miles 624 yards. The St. Gothard tunnel is 9½ miles; Mount Cenis tunnel is 7½ miles; Arlbergh tunnel (Austria), 6½ miles. There is a tunnel in Massachussetts, 4¾ miles; the Standega tunnel, on the London and North Western, is 3 miles long, and the Dox tunnel rather less. But the special feature of the Severn tunnel lies in the fact that 2¼ miles of it have been constructed from 45 to 100 feet below the bed of a rapidly-flowing tidal estuary, offering engineering difficulties which make it the most remarkable tunnel in the world.

◆

Sir Lowthian Bell once directed attention to the material from which the fire-boxes of locomotives are made. In this country they are generally made of copper, though we have to import it; in America they are generally made of steel, though part of that material has to be imported. In this country the cost is much more than it is in America, the excess being chiefly attributable to the different materials used. In discussing the question Mr. Worsdell, of the North Eastern Railway, remarked that in America, on the Pennsylvania Railroad, he had put in hundreds of steel fire-boxes without one failure. It would be interesting to know why in England we use the dearer material, and that when we have to import it, whereas a material elsewhere used is in our own possession and is neglected.

◆

PETROLEUM ON LOCOMOTIVES.

A method of using crude petroleum on locomotives, the invention of Mr. B. A. Moody, of Dedham, has been tried at the Hinckley Locomotive Works, in Boston, as applied to a condemned Boston and Providence engine. The crude petroleum is carried in a tank in the tender, and thence is conducted through a pipe into the fire-box. At the end of this pipe is a peculiar burner, the invention of Mr. Moody. Through a semi-circular slot, 1-16th of an inch across, the fuel flows out on to a flat table, of somewhat the shape of, but a little smaller than, an ordinary palm leaf fan. At the apex of this table, and just above the entering point of the petroleum, is the outlet of another pipe, which leads from the boiler of the locomotive. The steam, which is taken from the boiler at a pressure of about 150 pounds, is passed through a Mason valve, reducing the pressure to 40 pounds. At this pressure it sweeps across the flat table on which the petroleum is flowing, and forms a fine spray, which is forced through the interstices of a large pile of fire brick piled in the fire-box. When this spray is lighted, the heat, after a few minutes becomes intense, and in the opinion of the engineers present at the test a far higher temperature is obtained than can be by the combustion of coal in a locomotive fire-box. In order to get a steam pressure with which to start the flame, it is necessary to use a small auxiliary boiler, about the size of those used on small steam launches, but when the steam is once generated in the main boiler the pressure is taken direct. The apparatus for governing the supply of fuel is placed on the fireman's side of the cab, and, in the future, that individual will be relieved of the task of shovelling coal, and his chief duty will be to regulate the supply of petroleum by means of a couple of handles, which move along a slotted segment. In regard to the comparative cost of this method, it is claimed that the average consumption of petroleum for an engine drawing an ordinary train of passenger cars was found to be about two gallons per mile.

◆

SIMPLE WATER TESTS.

Test for Hard or Soft Water.—Dissolve a small quantity of good soap in alcohol. Let a few drops fall into a glass of water. If it turns milky it is hard; if not it is soft.

Test for Earthy Matter or Alkali.—Take litmus paper dipped in vinegar, and if, on immersion, the paper returns to its true shade, the water does not contain earthy matter or alkali. If a few drops of syrup be added to a water containing an earthy matter, it will turn green.

Test for Carbonic Acid.—Take equal parts of water and clear lime water. If combined or free carbonic acid is present, a precipitate is seen, to which, if a few drops of muriatic acid be added, an effervescence commences.

Test for Magnesia.—Boil the water to a twentieth part of its weight, and then drop a few grains of neutral carbonate of ammonia into a glass of it, and a few drops of phosphate of soda. If magnesia be present, it will fall to the bottom.

Test for Iron.—1. Boil a little nut gall and add to the water. If it turns gray or slate, black iron is present. 2. Dissolve a little prussiate of potash, and, if iron is present, it will turn blue.

Test for Lime.—Into a glass of water put two drops of oxalic acid and blow upon it. If it gets milky, lime is present.

Test for Acid.—Take a piece of litmus paper. If it turns red, there must be acid. If it precipitates on adding lime water, it is carbonic acid. If a blue sugar paper is turned red, it is a mineral acid.

CURATIVE POWER OF WATER.

There is no remedy of such general application and none so easily obtainable as water, and yet nine persons in ten will pass it by in an emergency, to seek for something of less efficacy. There are but few cases of illness where water should not be given the highest place as a remedial agent.

A strip of flannel or napkin folded lengthwise and wrung out of hot water and applied round the neck of a child that has croup will usually bring relief in ten minutes. A towel folded several times and quickly wrung out of hot water and applied over the seat of pain, in toothache or neuralgia, will generally afford prompt relief. This treatment in colic works like magic.

We have known cases that have resisted treatment for hours yield to this in ten minutes. There is nothing that will so promptly cut short a congestion of the lungs, sore throat, or rheumatism, as hot water when applied promptly and thoroughly. Pieces of cotton batting dipped in hot water and applied to all sores and new cuts, bruises and sprains, is the treatment now adopted in hospitals.

◆

TAKING TRAIN SPEEDS IN PRUSSIA.

For the regulation and checking train speeds, the Prussian authorities, after trying a number of speed recorders without full satisfaction, have concluded to introduce an "electric contact" apparatus, which has now been in use for nearly ten years, and on the Elberfeld system of Prussian roads is used on 144 miles of track. It consists of electric keys with strong springs placed outside the rails at regular intervals, the most approved distance being one kilomètre. The keys are depressed by each wheel, and the current thus sent through a wire to the next telegraph office causes a strip of paper, moved by clock-work, to be dotted for each depression; the paper moves at the rate of four centimètres a minute, and the distance apart at which the first dots of each two successive series appear, shews the rate of speed at which the train is moving. When the operator at a station gets word from the next one of a train's departure, he sets the paper in motion, and lets it run until the train reaches his station. The strip of paper which has run off in the meantime, is marked by cross strokes at its end, and the date, the number of the train and engine, and the name of the engine-driver are written upon it. The operator soon becomes accustomed to recognising the speed from the appearance of the spaces, and he is charged with the duty of noticing any obvious excess of the speed allowed. At the end of the day, the strip is removed and sent to head-quarters, as a part of the office report, the work of inspection being made easy by the notes on the strip. The driver is placed in position to check-up his own speed, as the contact-keys are visible by day, and recognisable by their click at night. This method is reported as highly satisfactory in checking the tendency of drivers to save coal by "loafing" up-hill and running down at full speed, the apparatus being arranged to show the speed for any desirable distance, or at any point shews whether express trains slow properly in passing stations, and it also indicates very closely the occurrence of a break-down and its position.—*English Mechanic.*

◆

Humorous.

HE WANTED SOMETHING "FRISKY."

"Got something frisky?" he asked, as he walked into a livery stable and called for a saddle horse—"something that will prance about lively, and wake a fellow out of his lethargy? I used to ride the trick mule in a circus, an' I reckon I can back anything that wears hair."

They brought him out a calico-coloured beast, with a vicious eye, and he mounted it and dashed off.

Before he had gone two blocks, the animal bucked, crashed through a high board fence, and plunged into a cellar, tossing his rider over the top of an adjacent woodshed, and landing him on the ragged edge of a lawn mower.

They bore him home, straightened him out, and three surgeons came in and reduced his dislocations, and plastered him up with raw beef.

A few weeks later he called at the stable, and said if they had a gentle saw-horse with an affectionate disposition, a bridle with a curb-bit and martingales, and a saddle with two horns and a crupper to it, he believed he would go up in the haymow and gallop around a little where it was soft and wouldn't hurt him.

◆

HIS BROTHER HAD THE ICE.

"Now," said drummer number one, as the train pulled out at Pittsburg, "I have a bottle of whisky. Let's sit down and have a real good time. I only wish we had sugar and ice; we could have some toddy.'

"I've some sugar," said drummer number two, unstrapping his valise.

"And my brother has some ice," said drummer number three; "he's in the baggage car. I'll just step in and get some," and he did.

The toddy was brewed and rebrewed. The whisky bottle was a large one, the supply of sugar seemed inexhaustible, and number three made as many visits to the baggage car as the occasion demanded.

However, just as they were all feeling good, and were about to compound a farewell drink, number three returned empty-handed. "Very sorry, boys," he remarked, "but the baggage man says if I take any more ice off my brother he won't keep."

COULDN'T PUP HIM OFF.

"You can't put a man off between stations; it's agin the law," excitedly said a seedy-looking passenger who had got on a Michigan Central train without ticket or money. "You can't do it in Michigan; we've got laws in this State I want ye to know, Mr. Conductor. I want to go to the next station, and if ye don't carry me for nothin', ye can run yer train back to the station where I got on. You know you can't put a man off between stations; you dassent. You know that if you did I would sue the company and get big damages. Now keep away from me—you can't put a man off between stations. What are you stoppin' this train for? You can't put a man off between—." The train stopped, there was a short scuffle, and, as we moved off again, with rapid puffs from the locomotive, the passengers stuck their heads out of the windows and saw an astonished face looking up from the midst of a snow-drift in which a falling body had just immersed itself. The mouth in the astonished face opened, muttered something like "You can't put a man—" and disappeared from view as our train rounded a curve.

A DECEIVER.

A gentleman, who was closely wrapped in a fur coat, surmounted by a cap to match, took a seat in a railroad car by the side of a lady. He made several attempts to draw her into conversation, but without avail. At last he exclaimed: "Madam, why are you so ungracious? Do you take me for a wolf in sheep's clothing?"

"No; quite the reverse," answered the lady.

GOT SOMETHING ELSE TO DO.

Captain Payne, who has just finished the survey of the road between La Crosse and Americus, ran upon a queer old customer the other day. We print a verbatim report of the conversation: "Layin' eout another railroad?" "Surveying for one," was the reply. "Goin' through my barn?" "Don't see how we can avoid it." "Wall, now, mister, I calcerlate I've got somethin' ter say 'bout that. I want you to understan' that I've got suthin' else tew dew besides run out tew open and shet them doors every time a train wants tew go through."—*Marion, Ga., Patriot.*

HOW SHE STRUCK IT.

A little girl who has just entered school jubilantly announced to her father that she turned down all the girls above her in the arithmetic class and went to the head. "That was smart in you," said he encouragingly; "how was it?" "Well, you see, Miss Maggie asked the girl at the head how much was eight and five, and she didn't know, and said twelve; and the next girl said nine, and the next one eleven, and the next one said fourteen. Such silly answers! Then Miss Maggie asked me and I said thirteen, and Miss Maggie told me to go to the head. Course it was thirteen." "That was nice," said the father; "I didn't think you could add so well. How did you know it was thirteen?" "Why, I guessed it. Nobody said thirteen!"

Poetry.

THE (RAILWAY) BRAKE.

(With due apologies to Lord Tennyson.)

I come from haunts of soot and smoke,
I dash a-down the valley,
From where the city Arabs choke
In crowded court and alley.

With hand on lever, tap, or brake,
I faster fly and faster,
If nerve should quiver, hand should shake
Then comes—the dread disaster.

By thrice three score of hills I flash,
'Neath full five hundred bridges,
Till into Terminus I crash,
Along the iron ridges.

Then off again—no rest I know,
Poor slave of brake and lever,
For trains must come and trains must go,
Tho' I go on for ever.

Thus day on day and week on week
At engine driving drudging ;
You ask, what great reward I seek ?
A crust— and given with grudging.

Through winter's blast, sleet, snow, or hail,
I rush like spirit haunted ;
If good folks get their morning mail
I've done the work that's wanted.

And when I'm spent! What then, dear God,
The workhouse ? Pray Thee never !
Far better lie beneath the sod,
To rest at last—for ever.

◆

GUILD'S SIGNAL.

Two low whistles, quaint and clear,
This was the signal, the engineer—
That was the signal that Guild, 'tis said
Gave to his wife at Providence.
As through the sleeping town, and thence
Out in the night,
On to the light,
Down past the forms lying white he sped.
As a husband's greeting, scant, no doubt,
Yet to the woman looking out,
Watching and waiting, no serenade,
Love song, or midnight roundelay
Said what that whistle seemed to say :
" To my trust true,
So love to you !
Working or waiting, good-night," it said.

Brisk young bagmen, tourists fine,
Old commuters along the line,
Brakesmen and porters glanced ahead,
Smiled as the signal, sharp, intense,
Pierced through the shadows of Providence :
" Nothing amiss—
Nothing !—it is
Only Guild calling his wife," they said.

Summer and winter, the old refrain
Rang o'er the billows of ripening grain,
Pierced through the budding boughs o'erhead,
Flew down the track where the red leaves burned
Like living coals from the engine spurned :
Sang as it flew :
" To our trust true,
First of all duty. Good-night " it said.

And then one night it was heard no more
From Stonnington over Rhode Island shore,
And the folk in Providence smiled and said
As they turned in their beds : " The engineer
Has once forgotten his midnight cheer."
One only knew.
To his trust true,
Guild lay under his engine—dead.

BRET HARTE.

◆

TO THE BOYS.

One word for the Boys whose faces are soiled,
But whose hearts are brave and strong ;
Whose hands are linked in unity true
And who sing one grand sweet song.

Ay the song of unity ringing out
With its sound of right good will,
Ever ready to lend its hand to help
Brothers toiling up life's steep hill.

There's plenty of ways in which to show
The Spirit of unity true and grand,
For many are wanting a cheery word
Or the help of a friendly hand.

Then, boys, be true to your noble selves,
Up! Up! let your banner wave;
Let the A.S.L.E.F. be the ensign true,
Of a band of men both grand and brave.

Though life is rough on the iron steed,
Boys, let us never forget to pray,
God protect us on the footplate true,
As we journey on life's rough way.

One of the Boys.

THE LOCOMOTIVE ENGINE.

Into the gloom of the deep, dark night,
With panting breath and a startled scream,
Swift as a bird in sudden flight,
Darts this creature of steel and steam.

Awful dangers are lurking nigh,
Rocks and chasms are near its track;
But straight by the light of its white eye,
It speeds through the shadows dense and black.

Terrible thoughts and fierce desires
Trouble its mad heart many an hour,
When burn and smoulder the hidden fires,
Coupled with might and power.

It hates, as a wild horse hates the rein,
The narrow track by vale and hill,
And shrieks with a cry of startled pain,
And longs to follow its own wild will.

O, what am I but an engine, shod
With muscle and flesh by the hand of God,
Speeding on thro' the dense dark night,
Guided alone by the soul's white light?

Often and often my heart tires,
And hates its way with a bitter hate,
And longs to follow its own desires,
And leave the end to the hand of fate.

O! pondrous engine of steel and steam;
O! human engine of flesh and bone;
Follow the white light's certain beam,
There lies safety, and there alone.

The narrow track of fearless truth,
Lit by the soul's great eye of light;
Oh, passionate heart of restless youth!
Alone will carry you thro' the night.

Correspondence.

NOTICE TO CORRESPONDENTS.

We do not hold ourselves responsible for the opinions expressed by Correspondents.

We reserve to ourselves the right to publish or reject any correspondence

Rejected correspondence will not be returned unless accompanied by a stamped envelope.

All correspondence to be written on one side of the paper only.

We shall be glad to receive articles of interest and information on Railway Work, Machinery, &c. (English or Foreign), interesting Stories of Railway experiences, information of accidents, or any subject of general interest.

All correspondence to be addressed to Mr. T. G. Sunter, General Secretary, 17, Mill Hill Chambers, Leeds.

Society News.

THE UNEMPLOYED MIDLAND RAILWAY STRIKERS.

Seven of the firemen and drivers living in Bradford, who were discharged from the service of the Midland Railway Company on account of their action in the recent strike, leave to-day by the Guion steamer *Wisconsin* for New York and Canada. A meeting of the members of the Bradford Branch of the Associated Society of Locomotive Engineers and Firemen was held at the Granby Hotel, Bradford, on Tuesday night, to bid farewell to them. Mr. T. G. Sunter, the general secretary of the Society; Mr. T. Ball, the organising secretary, and a number of members of the Leeds Branch, attended and addressed the meeting.—Mr. Sunter, in the course of his remarks, alluded to the manifesto issued by the chairman of the company, wherein he had stated that the reason for the proposed alterations in the conditions of service had arisen from the fact that the old system had a tendency to cause men to shirk their duties. He (the secretary) naturally concluded that the places of the men now out of employment would have been filled by thoroughly competent men. But, on the contrary, the officials had, to his knowledge, engaged men to take charge of their engines who had previously been discharged from their service for drunkenness, collisions, and for having undergone imprisonment for various crimes; and it was into the hands of such men as these that the company had entrusted the lives of the travelling public. The reason so few mishaps had occurred he thought was due to the fact that the old servants who had been taken back were sent to fire for the new hands, and were held responsible for the safe working of their trains. He then presented each intending emigrant with £5 from the funds of the Society, and wished them success in their undertaking.—Mr. T. Ball alluded to the treachery of those who had been the cause of the men having to sever their connection with all they held most dear, to seek a livelihood in a foreign land, and exhorted them to be of good cheer, because they were leaving their native land with honour. Though defeated, they were not disgraced. They could hold their heads erect, knowing that they had been fighting in the interests of their fellow-men, whom they were desirous of seeing in a position to assert their rights, and he hoped that when abroad they would keep true to their unionist principles. A resolution was carried thanking the Mayor (Ald. J. L. Morley), Sir Henry Mitchell, and Messrs. Mitchell Henry, Angus Holden, S. Ackroyd, and W. F. Gownell, and Lady Bective, and others for their kind sympathy and support. The intending emigrants spoke very feelingly of the kindness they had received from the inhabitants of Bradford, and the officials of their Society, and hoped that they might some day have the good fortune to be in a position to shew their appreciation of the same. A hearty vote of thanks having been given to the visitors, the meeting closed.—*Bradford Observer.*

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Having received so many congratulatory letters from the members of our Society in reference to the abilities of our solicitor and other gentlemen engaged in the defence of Taylor and Davies, a letter, of which the following is a copy, has been sent to Mr. Warren.

Associated Society of Locomotive
Engineers and Firemen,
Head Office, 17, Mill Hill Chambers,
Leeds, Jan. 14th, 1888.

Sir,—I am requested by nearly two thousand members of our Society, belonging to the branches appended, to express to you and the other legal and professional gentlemen engaged in the defence of Taylor and Davies, in connection with the Hexthorpe trial, their high appreciation of your distinguished abilities in bringing about such gratifying results, and trust that you will kindly convey the same.

I remain, sir, on behalf of the members of Liverpool, Stockport, Leeds, Plymouth, York, Sheffield, Mexborough, Lincoln, Llanelly, Bristol, Neath, Cardiff, Exeter, Pontypool, Nottingham, Newport, Peterborough, Oxford, London, Wolverhampton, Retford, Gloucester, Birmingham, Manchester, Grimsby, and Bradford,

Yours respectfully,
T. G. Sunter, *Gen. Sec.*
W. Warren, Esq., Solicitor, Leeds.

◆

Birkenhead, 1*st Feb.*, 1888.

Sir,—A New Branch of the Associated Society of Locomotive Engineers and Firemen was opened at Birkenhead, on Sunday, January 29th, 1888. Mr. T. Ball, Organizing Secretary, attended and delivered a most encouraging address, assisted by a number of Liverpool members, which resulted in a most successful issue; and there is every prospect of a considerable increase of members, now the branch has been formally opened.

Yours truly, Secretary.

◆

[A letter, of which the following is a copy, has been sent to Mr. Warren, by the Enginemen and Firemen of the M.S. & L. Railway:—]

To Wm. Warren, Esq., Solicitor, Leeds.

Sir,—The Manchester, Sheffield, and Lincolnshire drivers and firemen throughout the whole length and breadth of the line, would consider it not only a great dereliction of duty, but, what is of more importance still, a great act of ingratitude, were they to overlook the great service you have rendered to each and every one of us by the strenuous efforts you made over and above what could be expected from you in defence of our late fellow-workmen when so undeservedly put upon their trial at the late York Assizes. We no sooner saw them put in fetters than one and all we rushed to their relief, and at once sought your powerful aid to release them, and fortunate indeed were we to find that your able services were at our disposal. We are proud to congratulate you upon the valiant manner in which you conducted them through the ordeal through which they had to pass, and brought them out scatheless, and by so doing, brought joy and happiness back again to those homes and families which to all outward appearance had been rendered almost forlorn and destitute. Never, therefore, can we forget the great sympathy you evinced towards them, and the indefatigable zeal you displayed to bring about so glorious and successful an issue. Individually and collectively, then, we tender you our heartfelt thanks for your personal kindness over and above the most able and learned professional services rendered. What you did for them we consider as done to each and every one of ourselves. Again and again we thank you, and rest assured that your kindness and sympathy, as evinced in their regard, shall never be forgotten.

We remain, your obedient servants,

The whole body of Drivers and Firemen of the Manchester, Sheffield, and Lincolnshire Railway Co.

◆

At a recent meeting of our Executive Committee, the following resolutions were unanimously adopted :—

Resolved—"That this Society offers its congratulations to Brothers Taylor and Davies upon their acquittal in the Hexthorpe case, and at the same time directs the attention of all railway servants to the risks they run, and to the absolute necessity which there is for them to join together for their own protection and legal defence."

Resolved—"(1) That this Society, having carefully considered the circumstances of the Hexthorpe accident, strongly condemns as most dangerous the plan used by the Manchester, Sheffield, and Lincolnshire Railway Company of suspending the *absolute block system ;* (2) That in the opinion of this Society of Drivers and Firemen, the fatal collision at Hexthorpe would never have taken place if the M. S. and L. train had been provided with a proper automatic continuous brake ; (3) That copies of the foregoing resolutions be forwarded to the Members of Parliament for Doncaster, Sheffield, and Leeds, also to the Railway Department of the Board of Trade, and the Press."

Resolved—"That this Society views with regret and alarm the fact that long hours of duty on railways appear to be now on the increase, and hereby strongly protests against excessive hours of duty as dangerous to the public and unfair to the men themselves, and that in our opinion (1) ten hours a day of railway work is sufficient ; (2) that eight or nine hours' rest should be arranged between each term of duty ; (3) that eight hours at a stretch in a signal box should be considered sufficient, and that six hours at large junctions is quite long enough for signalmen to work without rest."

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We are pleased to note that our Consulting Engineer, Mr. Clement E. Stretton, has been elected a Fellow of the Society of Arts.

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A large meeting of enginemen and firemen was held at Grimsby, on Sunday, February 5th, when the General Secretary, Mr. T. G. Sunter, attended, and gave an exhaustive address upon the objects of the Society and the work it had been able to accomplish since its formation. The meeting was a very successful one, and a number of new members joined this flourishing branch at the close of the address.

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Manchester, Feb., 1888.

Sir,—It will no doubt interest your readers to know that a new branch of the Associated Society of Locomotive Engineers and Firemen was opened at Salford, on Sunday, January 22nd, 1888. Mr. T. Ball, Organizing Secretary, attended, and gave an interesting and impressive address, assisted by Mr. Harrison, of the Openshaw branch, at the close of which a large number were duly enrolled, and we feel certain of more branches in this district in a very short time.

I am, yours truly,
Secretary.

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Sir,

A great deal has been said of late respecting the amalgamation of the Locomotive Steam Enginemen's and Firemen's Friendly Society with the Associated Society of Locomotive Engineers and Firemen. Some members are very much opposed to the amalgamation, while others are very much in favour of such a course, but, whichever side is taken, whether for or against, I hope there will be no prejudice, but that each one will support that course which he thinks will most benefit his fellow-workmen.

I hope that I shall not be presumptuous if I offer a few reasons why I think the amalgamation would be beneficial to all concerned. In the first place what need is there for two societies for the same class of workmen when one is sufficient, and so constituted that it will meet all the requirements of enginemen and firemen, whether as a Friendly Society or as a Trades' Union.

Perhaps the answer will be, how can you expect us as members of the L.S.E. & F.F.S. to let you have our funds of £80,000 when you have no adequate amount of funds to place alongside of it.

I would reply that we do not wish to take any advantage of your funds, our object is solely this, to bring as far as possible the whole body of locomotive enginemen and firemen in this country into one grand association, for the purpose of improving our position as a body of responsible workmen, and by being combined in one grand organization to be able to give each other mutual support, either in sickness or old age, and to help the widow and orphans in the case of the death of a brother.

If prejudice can only be kept out of the way, and the amalgamation take place, the difficulties of arranging the funds can easily be overcome, and with regard to the older members, they could remain as they are at present, paying the same contributions, and receiving the same benefits as now. The younger members could, by paying a little more in contributions, become entitled to the full benefits of the A. S. L. E. & F., and thereby become members of a Trades' Union and Friendly Society at the same time.

The fact of there being no fund for the protection of our labour interests in the L. S. E. & F. F. S. was the cause of the A. S. L. E. & F. being established, and since its establishment the progress made has quite reached the anticipations of the most sanguine, its value per member is far greater than could have been reasonably expected in so short a time, and at the present time such progress is being made as to warrant the anticipation that before long the majority of locomotive enginemen and firemen in this country will be enrolled as members.

I would ask the members of L. S. E. & F. F. S. if they do not think it would be far better for them to be members of an association that, in addition to giving relief in sickness, old age, and death, would also protect the interests of their labour, I think most men will admit that it would be far better for them to be members of such an association, then I say at once support the amalgamation of the two societies, and let us become one grand organization for mutual help in all cases, whether for Trades' Union or Friendly Society purposes.

An army on the battle field, to be successful, must be directed, supported, and controlled, from one central body. The same may be said of the great army of enginemen and firemen; there is weakness in divided authority and action, and if you wish to be successful in defending or improving your labour interests, or for helping each other in Friendly Society matters, by far the best results will be obtained by thorough combination.

In this country there are over 30,000 locomotive enginemen and firemen, and I think most men will see the great advantage to all if we were all enrolled in one organization. We should be able to obtain a respectful hearing from our employers, and also get some attention paid to our appeals for reasonable concessions, whereas, at the present time, if we offer to send a deputation before them, with a view to coming to a better understanding with them in relation to our labour, we are very often snubbed, and very discourteously turned from the door, as if we were not endowed with common sense equally with themselves.

The only way to merit respect from others is by having respect for ourselves, and I think a man cannot claim to have that respect for himself he should have if he neglects to make provision for the protection of the interests of his labour, or his relief in sickness. What is the cause of so much sickness among our own class? I think it can clearly be traced to the want of provision for the comfort of the men while at work, and the unreasonable number of hours men are compelled to remain on duty at one time.

Being exposed to the inclemency of the weather so many hours weakens the system, and often brings on severe colds, which are admitted by all medical men to be the primary cause of most diseases.

This state of things could be remedied if men were thoroughly united in one organization, we should be listened to respectfully by our employers, and our recommendations would be acted on, our comforts would be studied, and our interests would be protected.

This argument could be carried to a much greater length, but I think enough has been said to show the advantage of being united in one grand organization. Therefore, I say, throw prejudice on one side, and look the object boldly in the face, and support that which will be most beneficial to us as fellow-workmen, and I feel sure the majority will decide that the amalgamation of the two societies will be the best means to attain the desired result.

THE LABOUR MOVEMENT.

The labour agitation which has prevailed throughout the country during the past twelve months, will, I believe, work out good instead of evil in the end. There is a growing feeling among working-men and capitalists that moderation, conciliation, and arbitration must be had. The good sense of American workmen, and the fairness, on the whole, of employers, will not long admit of differences hurtful alike to the interests of both. The two interests will come together and adjust themselves to the plain necessities of the situation. The great business communities and industrial centres cannot tolerate coercion on either side. Capital cannot afford to be overbearing, and labour cannot turn from peaceful channels without injury. What is needed and what the times require is full and fair consideration for both sides. This can be obtained through arbitration. Great wars have been averted by its agency. National instincts throughout the world favour its exercise more and more in settling difficulties between one nationality and another. So potent an agency cannot be overlooked in adjusting the labour problems now commanding wide interest and attention throughout civilised lands.

It commends itself to the good feeling which underlies the conduct of fair-minded men who may honestly differ. Neither the capitalist nor the labourer is wholly wrong. There is right on both sides. No one will justify oppressions complained of by candid and industrious working-men. The simple statement of their case will command public sympathy and approval. On the other hand, the public at large will promptly condemn the wilful destruction of property and the interruption of business. It is also prompt to disapprove of interference with private rights. As I have written before, there is room enough for every one in a country like this, and every man disposed to work must be allowed to find the chance. The working-man of to-day may be the capitalist five or ten years from now. He is interested in the considerate and friendly adjustment of all industrial questions. Capitalists and corporations are equally interested in the settlement to be hoped for. There can be no long antagonism. While the great problems touching capital and labour are under consideration, forbearance must be practised, and a willingness must be shewn by the employers of labour and by working-men themselves to settle all existing troubles in a frank and manly way. Labour must have its just rights, and a fair return for its service. The whole country will insist on achieving this result. Also it will insist on the proper remuneration of capital. The sense of fairness among the people will see that all sides are dealt with equitably and justly. Moderation and arbitration are the two great instrumentalities to be used. Capital and labour are ripe for the adjustment.

But the very conception of arbitration inplies organization of working-men—compact organization. That a good labour organization is a good thing I maintain, but that a heterogeneous mass of men engaged in divers occupations can combine interests satisfactorily to form an organisation which shall serve all and with equal justice, I very much doubt. "And if this could be done," I said in my recent address to the International Convention of Locomotive Engineers, "time has proved satisfactorily to the Brotherhood that it is sufficient unto itself. What the Brotherhood is and what it has accomplished, is the result of long-continued, patient work. Not until there is nothing more to be done for the Brotherhood can it afford to be become interested in other things foreign to the Order."

The members of the Brotherhood have taken, upon the adoption of their motto, "Sobriety, Truth, Justice, and Morality," a strong stand for right. Right alone for itself, and in itself considered, stands upon a broad basis, and is the only lasting foundation upon which a man can build. We sometimes boastingly allude to our rights; talk of the usurpation of our rights. Sift the matter, and what have you? Our rights are limited to our neighbour's wrong; beyond we may not go. Justice, however, steps in as mediator, and demands a wise adjustment of things, that equity may be maintained and the welfare of all promoted, whether it be that of the greatest or least. I have no sympathy for nor co-operation with any class or set of men who base their claims upon the principle that might is right, and the rich owe the poor a living. No man has a right to anything that does not come to him through the channel of honest acquirement. If you would have name, fame, or wealth, you must work for them.

Much has been said and more written concerning the antagonism between capital and labour. To my mind there is no such thing. Between work and idleness there has never been any feeling other than antagonistic, and it is those of the latter class who are attempting to poison the minds of the industrious. There seems to be generally prevalent an idea that all capitalists are rich, whereas the truth is that no great business enterprise is owned and controlled by one man, but by many, each contributing something toward the mighty whole. I will venture to say that most men of thrifty, industrial habits are capitalists. When we consider that capital is only invested wealth, I hope that every working-man can count himself a capitalist, be his pile ever so small. There is a dignity in the very effort to save with a worthy purpose, even though the attempt should not be crowned with eventual success. It produces a well-regulated mind ; it gives prudence a triumph over extravagance ; it gives virtue the mastery over vice ; it puts the passions under control ; it drives away care ; it secures comfort. Saved money, however little, will serve to dry up many a tear, will ward off many sorrows and heart-burnings which otherwise might prey upon us. Possessed of a little store of capital, a man walks with a lighter step ; his heart beats more cheerily. When interruption of work or adversity happens, he can meet it ; he can recline on his capital, which will either break his fall or prevent it altogether. By prudential economy we can realise the dignity of man, life will be a blessing and old age an honour.

Indeed, the desire to accumulate forms one of the most powerful instruments for the regeneration of society. It provides the basis for individual energy and activity. It is the beginning of maritime and commercial enterprise. It is the foundation of industry as well as of independence. It impels men to labour, to invent, and to excel. No idle or thriftless man ever becomes great. It is among those who never lost a moment that we find the men who have moved and advanced the world by their learning, their science, or their inventions. Labour of some sort is one of the conditions of existence. The thought has come down to us from pagan times that "labour is the price which the gods have set upon all that is excellent." The thought is also worthy of Christian times. Most men have it in their power by prudent arrangements to defend themselves against adversity, and to throw up a barrier against destitution. They can do this by their own individual efforts, or by acting on the principle of co-operation, which is capable of an almost indefinite extension. People of the most humble condition, by combining their means and associating together, are enabled in many ways to defend themselves against the pressure of poverty, to promote their physical well-being, and even to advance the progress of the nation. A solitary individual may be able to do very little to advance and improve society, but when he combines with his fellows for the purpose, he can do a very great deal. Civilization itself is but the effect of combining.

Such are my views, which are the result of my experience and observation as the chief officer of the Brotherhood of Locomotive Engineers, concerning the necessity and the benefits of the organization of labour, concerning the right principle and the effectiveness of arbitration, and concerning the desirability of every workman becoming a capitalist by saving, for its own sake, and because it prepares the way for a more general establishment of co-operation. There are legitimate purposes and results of labour organizations. The organization over which I have the honour to preside, by observing these principles of action, has during the past year satisfactorily adjusted grievances on ten different roads. While it did not obtain all the men desired in every instance, it did, however, succeed in securing an increase of wages, and established rules for their future protection. We do not believe in asking for more than a fair and just compensation, commensurate with the services rendered. In all dealings with the railway companies and the men, the officers of the Brotherhood endeavour to be governed by the golden rule, which is the rule of the Brotherhood—"Do unto others as ye would that others should do unto you." We concede to every man the same rights and privileges we claim for ourselves. Following this principle, the Brotherhood's relations with the railway officials are of the most friendly character. The members employed upon the Texas Pacific and Missouri Pacific roads and leased lines acted in a heroic and manly way during the strikes inaugurated by the Knights of Labour upon those roads. They were threatened, in order to induce them to abandon their engines and join the strikers, but they remained firm and true to the contract made with the company, winning for themselves and the Brotherhood at large the respect and admiration of all fair-minded men. Their loyalty and devotion to principle have convinced railway managers that a contract with the Brotherhood will be kept inviolate, and they will not hesitate in the future to enter into one when circumstances require it.

But labour organizations, like all other human agencies, have a limitation to their proper field of activity. If their legitimate and primary purpose be the improvement by association and organization of their members, both as men and as workmen, and the securing for them by united action a fair return for their labour and healthful conditions of work, it follows that when any organization goes beyond these primary and legitimate purposes it becomes to that extent something more than a labour organization, and it must expect to be criticised and judged by its actions. Thus an organization which makes nominations for public offices is a political organization. No matter if it is made up only of men who are working-men, if it does what a political organization does, it thereby becomes a political organization, and as such it will be and ought to be judged. When it reaches that point it becomes a subject of discussion and criticism from a political point of view, and not as a labour organization pure and simple.

The question whether a labour organization ought to become also a political organization is one that the members of every organization must answer for themselves. The Brotherhood of Locomotive Engineers is a labour organization pure and simple, and has had no inclination to convert itself into a political body. It has consequently met with none of those difficulties which have overtaken some other organization. No man's politics enters the order, and the order has not had any dissensions about theories of government which have disturbed others. It is as citizens and not as engineers that the men study these questions and vote on them—every one as he pleases; and it is as engineers and men of trustworthy character, and not as voters, that they are members of the Brotherhood. The experience of the Brotherhood in dealing with the questions of wages and hours of work, and all the questions that arise between employer and employé, has been satisfactory; and this being so, the purely social and political questions, I think, ought to be dealt with as purely social and political questions, and from my point of view they do not form a part of the labour question, properly considered, at all.

P. M. Arthur,
Grand Chief of the Br. of Loco. Eng. America.

CURIOUS PETS, and AMUSEMENTS of the LEARNED

Cardinal Wolsey had a curious pet in the form of a carp.

Cowper amused himself by playing with his hares, and making bird-cages.

Clive amused himself by playing with a pet tortoise.

The driver of a London hansom cab regularly carried a cub fox with him on his cab.

Grantley F. Berkeley made a household pet of a young stoat, rendered motherless by his gun. Totie soon adapted himself to his situation, and would leave his cage to wash himself in a finger-glass on the dinner table, trotting back again as soon as his ablutions were performed, taking a piece of sponge-cake with him.

Three maiden sisters sought to relieve the tedium of single blessedness by devoting their leisure to the domestication of English-born wasps. Before a week was over, one of the fair experimentalists wore a large blue patch over her left eye, another carried her right arm in a sling, and the third was altogether lost to the sight of anxious friends.

An American lady, residing at Brazil, enjoyed the society of one of those re-repulsive-looking reptiles—the Iguana. Pedro was well supplied with raw meat, bananas, and milk, allowed to bask in his mistress's room in the day-time, and to make himself cosy between the mattresses of her bed when the sun went down. His loving mistress carried him about in her arms—a practice which kept her acquaintances at a respectful distance—for however they might profess to admire Mr. Pedro Iguana's beadlike spots of black and white, his bright jewelled eyes, and elegant claws, they were careful not to make any near approaches. Nothing pleased the lady so much as to drop her pet without warning, at the feet of unsuspecting gentlemen, and eliciting from naval officers such symptoms of terror as would not have been drawn forth by an exposure to a broadside from an enemy.

A fair Switzer made a companion of a young wolf, and had the melancholy satisfaction of seeing the fond beast fall dead at her feet in a paroxysm of joy at her return home after a long absence.

Another lady possessed a loving leopard, that came regularly to her chamber door in the dead of night, and howled loudly until its mistress turned out of bed and quieted her disturber with an offering of warm milk.

Dr. Johnson was particulary fond of his cat, and would himself go and buy oysters for it, because his servant was too proud to do so.

Charles II. was fond of feeding ducks in St. James's Park, and in rearing a kind of spaniel, which were afterwards known as King Charles.

Shelley amused himself by making paper boats, and floating them in any water he chanced to see.

The poet Thomson very commonly used to eat peaches, as they grew on the trees, with his hands in his pockets.

Beethoven delighted in splashing in cold water at all times of the day, until his room was flooded.

Henry Quatre was particularly fond of going amongst the peasantry in disguise.

Cromwell frequently played blindman's buff with his daughters and servants.

Petavius, when employed in his *Dogmata Theologica*, a work of the most profound and extensive erudition, would, at the end of every second hour, twist his chair for five minutes.

Spinoza unbent his mind by setting spiders to fight each other; and observed their combats with so much interest, that he was often seized with immoderate fits of laughter.

Cardinal de Richelieu found recreation in violent exercises, and he was once discovered jumping with his servant, to try who could reach the highest side of a wall. De Grammont, observing the Cardinal to be jealous of his powers, offered to jump with him; and, in the spirit of a courtier, having made some efforts which nearly reached the Cardinal's, confessed the Cardinal had surpassed him. This was jumping like a politician; and by this means is said to have ingratiated himself with the minister.

The great Samuel Clarke was fond of violent exercise, and this profound logician has been found leaping over tables and chairs. Once, perceiving a pedantic fellow, he said, "Now we must desist, for a fool is coming in."

Rohault wandered from shop to shop to watch the mechanics labour.

Some authors have found amusement in writing treatises on odd subjects. Seneca wrote a burlesque narrative of Claudian's death; Pierius Valerianus an eulogium on the North Wind; Heinsius on the Ass; Menage, the Transmigration of the Parasitical Pedant to a Parrot, and on the Petition of the Dictionaries; Erasmus composed, in order to amuse himself when travelling in a post-chaise, his panegyric on Moria or Folly, which authorised by the pun, he dedicated to Sir Thomas More; Sallengre, in like manner, wrote in imitation of his work, a panegyric on ebriety, in which he says that he is willing to be thought as drunken a man as Erasmus was a foolish one; Synesius composed a Greek panegyric on baldness.

The Right Hon. W. E. Gladstone, M.P., as is well known, is very fond of wielding his axe as an amateur woodman.

The Right Hon. Robert Lowe, M.P., is an excellent bicycle rider, and an enthusiastic "rinker."

Socrates was very fond of playing with children.

ANCIENT WONDERS.

Nineveh was fourteen miles long, eight miles wide, and forty-six miles around, with a wall one hundred feet high and thick enough for three chariots abreast. Babylon was fifty miles within the walls, which were seventy-five feet thick, and one hundred feet high, with one hundred brazen gates. The temple of Diana, at Ephesus, was four hundred and twenty feet to the support of the roof. It was one hundred years in building. The largest of the pyramids was four hundred and eighty one feet in height, and eight hundred and fifty three feet on the sides. The base covered eleven acres. The stones are about sixty feet in length, and the layers are two hundred and eight. It employed 350,000 men in building. The labyrinth of Egypt contains three hundred chambers and twelve halls. Thebes, in Egypt, presents ruins twenty-seven miles around, and contained 350,000 inhabitants and 400,000 slaves. The temple of Delphos was so rich in decorations that it was plundered of $50,000,000, and the Emperor Nero carried away from it two hundred statues. The walls of Rome were thirteen miles around.

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EASY CURE FOR SLEEPLESSNESS.

I had frequently noticed that when engaged in deep thought, particularly at night, there seemed to be something like a compression of the eyelids, the upper one especially, and the eyes themselves were apparently turned upward, as if looking in that direction. This invariably occurred; and the moment that, by an effort, I arrested the course of thought, and freed the mind from the subject with which it was engaged, the eyes resumed their natural position and the compression of the lids ceased. Now, it occurred to me one night that I would not allow the eyes to turn upward, but kept them determinedly in the opposite position, as if looking down; and having done so for a short time I found that the mind did not revert to the thoughts with which it had been occupied, and I soon fell asleep. I tried the plan again, with the same result; and after an experience of two years I can truly say that unless when something especially annoying or worrying occurred, I have always been able to go to sleep very shortly after retiring to rest. There may occasionally be some difficulty in keeping the eyes in the position I have described; but a determined effort to do so is all that is required, and I am certain that if kept in the down-looking position it will be found that composure and sleep will be the result.

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HISTORY OF THE STEEL PEN.

The early history of the steel pen is curiously obscure. The most diligent search fails to discover the first maker, or the earliest date of this implement. There were steel, or rather iron pens made, we believe, in Holland, as early as the middle of the seventeenth century.

Towards the close of the last century, Mr. Harrison, an ingenious Birmingham mechanic, made steel pens for Dr. Priestly. One of them is nothing more than a tube turned out of a flat strip of metal, with the sides and points filed away in the shape of a pen. The first actual supply of such pens, it is believed (the authority for the statement is no more than local tradition) was made by a Sheffield workman whose name is forgotten. From time to time, as far back as 1809, steel pens, hand fashioned, turned and filed, were made as curiosities or luxuries for presents; but it was not until about 1824 that such instruments were produced in considerable quantities, as regular articles of manufacture. Mr. James Perry was the first manufacturer, but the process was tedious and costly. The metal was steel rolled out of wire, and for this Mr. Perry paid as much as seven shillings a pound. To the first person he employed he gave five shillings for making each pen; and even when the trade had become regular, he gave, for some years, as much as thirty-six shillings a gross to his workmen. Now, thanks to machinery and modern improvements, pens — not very good, perhaps, but good enough to write with—can be made and sold at a profit for three cents per gross !

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TO GIVE CHILDREN AN APPETITE.

Give the children an abundance of outdoor exercise, fun and frolic ; make them regular in their habits, and feed them on plain, nourishing food, and they will seldom, if ever, complain of a lack of appetite. But keep them overtasked in school, confined closely to the house the rest of the time, frowning down every attempt at play ; feed them upon rich or high seasoned food, candies, nuts, etc. ; allow them to eat between meals and late in the evening, and you need not expect them to have good appetites. On the contrary, you may expect that they will be pale, weak, and sickly.

Don't cram them with food when they don't want it, or have no appetite—for such a course is slow murder. If they have no appetites, encourage, and, if need be, command them to take exercise in the open air. Don't allow them to study too much, and especially keep them from reading the exciting literature which so much abounds in our bookstores and circulating libraries. In addition to securing for the children as above, change the diet somewhat, especially if they have been eating fine flour, change to coarse or graham flour.

Sickness is the most expensive thing on the face of the globe. There may be instances where it makes people or children better, but, generally, it makes them selfish, sad, misanthropic, nervous, mean, and miserable. The best way to make children happy and good is to keep them well.

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POWER OF A BUSHEL OF COALS.

It is well known to modern engineers that there is virtue in a bushel of coals properly consumed, to raise 70 millions of pounds weight a foot high. Let us pause a moment, and consider what this is equivalent to in matters of practice. The ascent of Mont Blanc from the valley of Chamouni is considered, and with justice, the most toilsome feat that a strong man can execute in two days. The combustion of two pounds of coal would place him on the summit. The Menai bridge, one of the most stupendous works of art that has been raised by man in modern ages, consists of a mass of iron not less than four millions of pounds weight, suspended at a medium height of about 120 feet above the sea. The combustion of seven bushels of coal would suffice to raise it to the place where it hangs. The great Pyramid of Egypt is composed of granite. It is 700 feet in the side of its base, and 500 in perpendicular height, and stands on 11 acres of ground. Its weight is, therefore, 12,760 millions of pounds, at a medium height of 125 feet, consequently, it would be raised by the effort of about 630 chaldrons of coal. The annual consumption of coal in London was in 1850 estimated at 1,500,000 chaldrons. The effort of this quantity would suffice to raise a cubical block of marble, 2,200 feet in the side, through a space equal to its own height, or to pile one such mountain upon another. The Monte Nuovo, near Tozzuoli (which was erupted by volcanic fire in a single night) might have been raised by such an effort from a depth of 40,000 feet, or about eight miles.

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CONTINUOUS AUTOMATIC RAILWAY BRAKES.

The subject of the application of brakes to railway trains is one that has engaged the attention of the responsible engineers upon our railways for a lengthened period, and during this period those officers charged with the conduct of our railways, have from time to time carried out a series of careful and exhaustive practical working tests of numerous systems of brakes. Whilst these tests were in operation, much interest was naturally developed in this very important subject, not only amongst the practical railwaymen themselves, but also amongst the travelling public, and very numerous have been the letters written on what has been aptly termed "the battle of the brakes." Ultimately there became but two competitors in the field, viz.: those using compressed air as the operating power of the brakes, and those using air at the ordinary atmospheric pressure, these two systems being known as air pressure brakes and vacuum brakes. As far back as April, 1881, the engineers of our leading trunk railways gave their unanimous opinion in favour of vacuum brakes, and since that date and at the present time, very rapid progress is being made in equipping the rolling stock of our railway systems with this brake in its continuous and automatic form. As a fitting sequel to the foregoing, a short description of the vacuum continuous brake will be of interest. As in other systems of brake, the retarding force or power is obtained by applying cast-iron brake blocks to the various wheels throughout the train, so that when the brake is applied each vehicle is arrested in its progress simultaneously, and in proportion to its weight and the force with which the brake is applied. To obtain this result, there is placed upon the locomotive an ejector or air exhauster, by the use of which a vacuum is created in the main brake pipe running throughout the train. The locomotive and its tender, and each vehicle composing the train is provided with a brake cylinder in which works a frictionless piston, its packing being a very simple rolling ring of rubber, it is obvious that when the ejector is put into operation, as each of these cylinders is connected with the main pipe, a vacuum will also be created in them, and it is upon the destruction of this vacuum, by accident or design, that the brake is applied. Each brake cylinder has attached to it what is termed the ball valve, and to this a flexible connection with the main pipe is made. The simple, frictionless rolling ball in this valve is so arranged that upon the destruction of the vacuum in the main pipe the air, by the seating of the ball, is instantly prevented from passing to the top side of the brake piston, whilst it can and does pass freely to the underside of the said piston, and the piston being at once lifted thereby, it (through the lever and rods connected to it) simultaneously applies the brake blocks to the wheels. Throughout the train the main pipe is connected from one vehicle to another by means of a plain and exceedingly simple universal coupling, which cannot by any means be coupled together wrongly, and will by any accidental severance of the train at once become parted without damage to the couplings themselves. Each guard's van is provided with a valve to enable the guard to apply the brake throughout the train in cases of emergency, and it will arrest the train speedily, even should the engineman, through any means, be unable or omit to shut off steam. Further, these valves open automatically upon sudden applications of the brake, and to them is attached a vacuum gauge from which the guard can at once discern whether the brake is ready for use. The entire brake is readily operated by one handle, conveniently placed upon the ejector and at the command of the engineman. By the movement of this handle the brake can be applied any number of times in rapid succession, and this (by the working of the ball valves) without destroying its full power, which is always intact, and ready for an emergency or other stop. Through this one handle of the ejector, moreover, the brake is capable of the very nicest graduation, that is, the force applied to the brake blocks can be increased or diminished according to the requirements of the case, and this without removing the brake blocks from the wheels. With the pressure brake system this graduated or variable pressure upon the blocks cannot be obtained without first removing the brake blocks from the wheels, and then again applying them with the power reduced as may be desired. It is not at all difficult to foresee cases in which this intermittent working of the pressure system upon descending grades might produce the most serious difficulties, as during the momentary releasing of the brake before it be re-applied the train may ultimately so gain in speed as to become uncontrollable. This fact has evidently been fully realised, for upon railways having long gradients such as those on the Rocky Mountains, the Alleghenies, the Paris, Lyons and Mediterranean, the pressure system is worked as a non-automatic brake in order to overcome the before mentioned serious objection. It may be taken for granted that as this defect has not been remedied in the pressure system, it having been apparent for some years, that it is one which has proved itself to be unremediable. The vacuum automatic brake has, since its adoption as the standard for our trunk lines, proved itself to be both rapid in its application, efficient in its working, simple in construction, most readily controlled, and through the studied absence of frictional surfaces costs practically *nil* for maintenance. In the vacuum automatic brake the pressure being external, has of course the effect of keeping all joints tight, there being an entire absence of that internal bursting strain upon hose pipes and fittings which must always remain a grave inherent defect in pressure brakes. Many instances have occurred in which trains have been, by the bursting of a pressure pipe, not only inconveniently detained, but trains are through it liable to be pulled up suddenly at dangerous parts of the line, and in tunnels, etc., with the risk of collision consequent thereon, this has unfortunately been the case with disastrous consequences on more than one occasion. Upon January 7th, 1886, an accident was caused through a burst tube upon the G. E. Ry., at Manor Park, and rumour states that this was also the cause of the collision upon the Government Railways of Victoria, mentioned in the papers of May 12th. As has been previously stated, there being in the vacuum brake an entire absence of internal pressure, such accidents could not possibly be occasioned by it.

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Interesting Extracts.

SPACE-MEASURING.

Imagine a railway from here to the sun. How many hours is the sun from us? Why, if we were to send a baby in an express train, going incessantly at a hundred miles an hour, without making any stoppages, the baby would grow to be a boy—the boy would grow to be a man—the man would grow old and die—without reaching the sun, for it is distant more than a hundred years from us. Had Adam and Eve started by our railway at the creation, to go from Neptune to the sun, at the rate of sixty miles an hour, they would not have got there yet, for Neptune is more than six thousand years from the centre of our system. But we are getting into large numbers again; we must have some swifter servant than a railway to measure space for us. Light will answer our purpose—for light travels from the sun to the earth in eight minutes. Eight minutes, then, counting by light are equivalent to a hundred years of railway express speed! It would take about four hours to go from the sun to Neptune. Among the stars we shall find that the nearest is three years off, counting by light.

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CALM AND PEACEFUL IN THE FACE OF DANGER.

During the wars of the last century which were waged between the white settlers and the Red Indians of North America, a party of the Society of Friends had settled in one of the remotest parts of the State of New York. Though warned of the risk they were running, they persisted, and erected a wooden structure as a meeting-house. While assembled one day for worship, and engaged in silent prayer, a party of Indians, adorned in all their war-paint, and carrying as trophies the skulls of their victims, approached; the chief of the party entered cautiously in at the door, followed by his comrades.

The calm, unmoved attitude of the worshippers, the solemn awe and stillness of the place, made an impression on the Indians, who, at a sign from one of the elders, seated themselves. At the close of the meeting they were taken to the home of one of the people, and after partaking of bread and cheese which was set before them, the chief of the band said, "When Indian came to this place he meant to tomahawk white man, but seeing white man no guns, no swords, not frightened, worshipping great Spirit, Indian no hurt white man."

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LAST WORDS.

However physiologists may question the importance of the feeble utterances of the dying, it is certain that mankind in general finds a deep significance in the last words of those who are vanishing into the unknown life.

"He raves!" said the physician, when Dr. Adams, Rector of the High School of Edinburgh, was passing away; but as we catch the last words of the raving, our own eyes are dimmed. "It grows dark, boys," stretching forth his hand; "you may go." "All my possessions for a moment of time!" moaned Queen Elizabeth. Wesley, calmer, said, as he died, "The best of all is, God is with us." And deaf Beethoven, whose soul had ever been filled with harmony, exclaimed gladly at the last, "I shall hear!"

"Is your mind at ease?" Goldsmith was asked by his physicians. "*No, it is not,*" was the mournful reply, and he spoke no more. How different the parting words of Dr. William Hunter: "If I had strength to hold a pen, I would write how easy and pleasant a thing it is to die." Or the assurance of President Edwards, as his dying grasp loosened on hard forms of dogma, "Trust in God and you need not fear."

Byron said wearily, "I must sleep now," and Gœthe, turning to his wife, called for "Light, more light!"

Dr. Johnson died in a tumult of uneasiness and dread. Cowper sank to rest as peacefully as a child. "I am taking a fearful leap in the dark," cried Hobbes, the Deist; and "Now, Lord, Lord, receive my soul!" whispered Herbert on his last "sweet day."

Politeness was no longer a ruling passion, but a chrism, when Chesterfield in dying said, "Give Dayrolles a chair," and surely something was forgiven of Charles the Second, when he bade farewell to earth's pomp and wickedness in "Don't let poor Nelly starve."

Haller's last words were, feeling his own pulse, "The artery ceases to beat." Petrarch died silently and suddenly in his library, his hand upon a book; and Sir Isaac Newton was winding his watch when he was ushered into the life that hath no end.

Talma, the great actor, excalimed pitifully as he went, "The worst of all is, I cannot see," and John Locke murmured, "O the depth of the riches of the goodness and knowledge of God!" The dying admonition of the learned Grotius to his race was, "Be serious." Scarron, the French wit, said faintly to his weeping friends, "Ah! *mes enfans*, you can not cry as much for me as I have made you laugh in my time;" and Lord Thurlow in reckless wonder exclaimed "I'm shot if I don't believe I'm dying."

When poor Robert Burns gasped with his last breath, "Don't let the awkward squad fire over me!" he did not allude to his commentators and critics, yet what a significance should the words have for them! And how little Anne Boleyn thought, when awaiting the executioner, she clasped her fair throat, that "It is but small, very small," would link her forever to the heart of Christendom.

Yet we cannot doubt that many of the most eloquent sermons mankind has ever listened to have fallen from dying lips. Cæsar's grieved "And thou, Brutus!" John Quincy Adams's "This is the last of earth;" Mirabeau's frantic cry for "Music" after a life of discord; George Washington's "It is well;"—do they not grow richer in meaning every day? And is it not still blessed to remember the last moments of

Melancthon, the friend of Luther? "Do you want anything?" asked his loved ones eagerly. "Nothing but heaven," he answered gently, and went smiling on his way.

◆

HOW LONG TO SLEEP.

A prolonged and severe exertion, whether of brain or muscle, requires a correspondingly lengthy or deep repose. The great point is to secure what Bichat characterized as general sleep. The Irishman who explained that a short sleep did for him because when he slept he "paid attention to't," uttered a truth in his witticism. If sleep be thorough, then a short spell will do more good than a much longer period that is incomplete and imperfect. On general principles we may sleep all we can, unless we are lazy, then sleep less. The active, wide-awake, energetic, go-ahead people rarely sleep too long.

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The Bureau of Statistics in Berlin has recently issued some interesting information in connection with power. It appears that four-fifths of the engines now working in the world have been constructed during the last twenty-five years. France owns 49,590 stationary or locomotive boilers, 7,000 locomotives, and 1,850 boats' boilers; Germany has 59,000 boilers, 10,000 locomotives, and 1,700 ships' boilers; Austria, 12,000 boilers and 2,800 locomotives. The force equivalent to the working steam engines represents—in the United States, 7,500,000-horse power; in England, 7,000,000-horse power; in Germany, 4,500,000-horse power; in France, 3,000,000 horse power; and in Austria, 1,500,000-horse power. In these figures the motive-power of the locomotives is not included, whose number in all the world amounts to 105,000, representing a total of 3,000,000-horse power. Adding this amount to the other powers, we obtain a total of 46,000,000 horse power. A steam horse power is equal to three actual horses' power; and a living horse is equal to seven men. The steam engines of the world represent, therefore, approximately the work of 100,000,000 men, or more than double the working population of the earth, whose total population amounts to 1,455,923,000 inhabitants. Steam has accordingly trebled man's working power, enabling him to economise his physical strength while attending to his intellectual development.

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DEATH OF ENGLISH KINGS.

William the Conqueror died from enormous fat, from drink, and from the violence of his passions.

William Rufus died the death of the poor stags which he hunted.

Henry I. died of gluttony.

Henry II. died of a broken heart, occasioned by the bad conduct of his children.

Richard Cœur de Lion, like the animal from which his heart was named, died by an arrow from an archer.

John died, nobody knows how; but it is said from chagrin, which we suppose is another term for a dose of hellebore.

Henry III. is said to have died a "natural death."

Edward I. is likewise said to have died a "natural sickness"– a sickness which would puzzle all the College of Physicians to denominate.

Edward II. was most barbarously and indecently murdered by ruffians employed by his own mother and her paramour.

Edward III. died of dotage, and Richard II. of starvation—the very reverse of George IV.

Henry IV. is said to have died of "fits caused by uneasiness;" and uneasiness in palaces in those times was a very common complaint.

Henry V. is said to have died of "a painful affliction, prematurely." This is a courtly term for getting rid of a king.

Henry VI. died in prison, by means known then only to his jailor, and now known only to Heaven.

Edward V. was strangled in the Tower by his uncle, Richard III.

Richard III. was killed in battle.

Henry VII. wasted away as a miser ought to.

Henry VIII. died of carbuncles, fat, and fury.

Edward VI. died of a decline.

Queen Mary is said to have died of a broken heart.

Old Queen Bess is said to have died of melancholy, from having sacrificed Essex to his enemies.

James I. died of drinking and the effects of vice.

Charles I. died on the scaffold.

Charles II. died suddenly—it is said of apoplexy.

William III. died from consumptive habits of body, and from the stumbling of his horse.

Queen Anne died from dropsy.

George I. died of drunkenness, which his physicians politely called an apopletic fit.

George II. died of a rupture of the heart, which the periodicals of that day termed a visitation of God.

George III. died as he had lived—a madman. Throughout life he was, at least, a consistent monarch.

George IV. died of gluttony and drunkenness.

William IV. died amidst the sympathies of his subjects.

LOCOMOTIVE ENGINEERS AND FIREMEN'S
Monthly Journal.

"This that they call Organization of Labour is the universal vital problem of the world. It is the problem of the whole future for all who will in future pretend to govern men."—THOMAS CARLYLE.

"I know no better definition of the rights of man:—Thou shalt not steal; Thou shalt not be stolen from; what a society were that—PLATO'S REPUBLIC, MORE'S UTOPIA, *mere emblems of it! Give every man what is his—the accurate price of what he has done and been—no more shall any complain, neither shall the earth suffer any more."*—THOMAS CARLYLE.

VOL. 1. MARCH, 1888. NO. 2.

IN all countries, and at all times, capital has been used by those possessing it to monopolise particular branches of business, until the vast and various industrial pursuits of the world have been brought under the immediate control of a comparatively small portion of mankind. Although an unequal distribution of the world's wealth, it is perhaps necessary that it should be so. To attain the highest degree of success in any undertaking, it is necessary to have the most perfect and systematic arrangement possible; to acquire such a system it requires the management of a business to be placed, as nearly as practicable, under the control of one head; thus concentration of wealth and business tact conduces to the most perfect working of the vast business machinery of the world. And there is perhaps no other organisation or society so well calculated to benefit the enginemen and firemen of this country if those possessed of wealth were all actuated by those pure and philanthropic principles, so necessary to our happiness; but, alas! such is not the case.

"Wealth is power," and practical experience teaches us that it is a power but too often used to oppress and degrade us. It therefore becomes us, as men who have to battle with the stern realities of life, to look this matter fair in the face. There is no dodging the question: let every man give it a fair, full, and candid consideration, and then act according to his honest convictions. What position are we, the enginemen and firemen of the United Kingdom, to hold in society? Are we to receive an equivalent for our labour sufficient to maintain us in comparative independence and respectability, to procure the means with which to educate our children, and to qualify them to play their part in the world's drama; or must we be forced to bow the suppliant knee to wealth? We know that single-handed we can accomplish nothing, therefore would have to submit to any conditions imposed upon us; but united, there is no power of wrong we may not openly defy, for in unity there is strength, and by joining our Association—which is composed of enginemen and firemen only, and whose interests and sympathies are identical—lies their only hope. We urge all who have not already joined us to do so as speedily as possible, and do not be persuaded into the idea that we cannot succeed as a class, for this is no theory or visionary plan, but one eminently practicable, and worthy of the serious consideration of all who have the desire to see enginemen and firemen in a position sufficiently strong to resist further encroachments, and to elevate their moral and social condition, which is the aim and object of our Association.

Scientific.

EDISON'S NEW PHONOGRAPH.

Ten years ago Mr. Edison announced his invention of a machine for the storage and reproduction of speech, and the announcement was received at the time with a good deal of incredulity, notwithstanding the partial success of Faber and others in devising mechanical articulators. The simplicity of Edison's invention, when it was seen and heard, however, elicited much admiration, and though the novelty as then constructed did not answer all the expectations which a sanguine inventor had raised concerning it, there is no doubt it was regarded as a remarkable instrument and the germ of something better. When the words spoken into the apparatus were heard in the first instance their reproduction by it seemed unmistakably like; indeed, so close was the replica of sounds that a member of the French Academy of Sciences distinguished himself by refusing to believe it was not the effect of ventriloquism or some other trickery. Nevertheless, it was evident that before the phonograph could become the practical instrument it was intended to be some further improvements in the nicety of its articulation were required in order that the reproduction could be understood of itself without any prior inkling of its tenour. The introduction of the electric light diverted Mr. Edison's energies from the task of improving it, although he does not seem to have lost faith in his pet invention. During these ten years he has been the means of introducing both electric light and power to the world at large. Quite recently, however, he returned to his earlier love, and has at length, it appears, succeeded in perfecting it so far as to redeem his past promises and fulfil his future hopes respecting it.

The old instrument consisted, as is well known, of a vibrating tympan or drum, from the centre of which projected a steel point or stylus in such a manner that on speaking to the tympan its vibrations urged the stylus to dig into a sheet of tinfoil moving past the point. The foil was supported on a grooved barrel so that the hollow of the groove behind it permitted the yielding leaf to give under the point of the stylus, and caused it, instead of penetrating the foil, to indent it more or less, according to the force of the vibrations of the tympan. The result was that along the spiral groove of the barrel the sheet of tinfoil was deformed with undulations corresponding to the vibrations of the speech. Thus recorded on a yielding, but somewhat stiff material, these undulations could be preserved and at a future time made to deflect the point of a similar stylus and set a similar tympan into vibration so as to give out the original sounds or a fair imitation of them.

Tinfoil, however, is not a very satisfactory material on which to impress the vibrations in the first place. It does not respond precisely to the movements of the marking stylus in taking the impression; neither does it guide the stylus sufficiently well in reproducing the sounds. Mr. Edison, like Professor Bell, has therefore adopted wax in the new phonograph, and instead of tinfoil spread on a grooved support, he now employs a cylinder of wax to take the print of the vibrations. Moreover, he no longer uses the same kind of tympan both to print and emit the sounds, but employs a more delicate one for receiving than recording. The marking cylinder is also kept in motion by an electric motor worked by a few cells, instead of being turned by hand, as in the earlier apparatus.

The new phonograph is about the size of an ordinary sewing machine, and is of exquisite workmanship, the performance depending to a great extent on the precision and perfection of the mechanism. It consists of a horizontal spindle, carrying at one end the wax cylinder on which the sonorous vibrations are to be imprinted. Over the cylinder is supported a stout diaphragm or tympan provided with a conical mouthpiece for speaking into. Under the tympan there is a delicate needle or stylus with its point projecting from the centre of the tympan downwards to the surface of the wax cylinder, so that when a person speaks into the mouthpiece the voice vibrates the tympan and drives the point of the stylus down into the wax, making an imprint more or less deep in accordance with the vibrations of the voice. The cylinder is kept revolving in a spiral path at a uniform speed by means of the electric motor, which is fitted with a sensitive regulator and situated in the base of the machine. The result is that a delicate and ridgy trace is cut in the smooth surface of the wax along a spiral line. This is the sound record, and by substituting a finer tympan for that used in producing it, the ridges and inequalities of the moving trace can be made to agitate a light stylus bearing on them, and cause it to set the delicate tympan into vibrations corresponding very exactly to those of the original sounds. The receiving tympan is made of goldbeaters' skin, and has a stud at its centre to which a springy pointer of steel wire is attached. The sounds emitted by it are very feeble—in fact a whisper—as compared to the original ones; but they are faithful in enunciation, which is the main object, and they are conveyed to the ear by means of flexible hearing tubes.

The tympans are interchangeable at will, and the arm which carries them is provided with a turning tool for smoothing the wax cylinder before it receives the print. The cylinders are made of different sizes, from one to eight inches long and four inches in diameter. The one-inch cylinder has a storage capacity of 200 words; the next size contains 400 words, and so on. Mr. Edison states that four of the eight-inch cylinders can record all "Nicholas Nickleby," which might, therefore, be automatically read by a phonograph to a solitary invalid or to a number of patients in a hospital simultaneously by using several hearing tubes, one for each person. The cylinders can be readily posted like letters and made to deliver their contents *viva voce* in a duplicate phonograph, every tone and expression of the writer being rendered with more or less fidelity. In addition to facilitating correspondence by dictation, Mr. Edison hopes that the new instrument will be useful in matters of law and in the interests of justice—for example, in the detective service, as the camera is now. It also lends itself to type setting by the gradual reproduction of a dictated article in the ear of the compositor, and it may also be employed to copy music and render it again. In short, a lively imagination can suggest many applications of it, from the record of animal sounds, foreign languages, and decaying dialects, to the preservation of vocal efforts by famous orators and singers, or the accents of friendly voices which will some day be stilled. A special factory has, we believe, been provided by Mr. Edison for the exclusive manufacture of this machine.—*Times.*

A SELF-CLOSING CARRIAGE WINDOW.

Although this is an age in regard to which it is said that a want, if suggested, can always be supplied, there are many little matters of personal discomfort which seem to escape observation, possibly from the fact that, being with us daily, we are inclined to accept them as a necessary evil too insignificant to command the attention of inventive genius. Amongst these, the shortcomings of the railway carriage window, as at present constructed, are certainly not the least. Who has not experienced the inconvenience of carriage windows fixed down in bleak, north-easterly weather, or held under control by ill-natured fellow-passengers who have been fortunate enough to secure the corner seats, or of the dusty and dirty, or saturated seats resulting from the neglect of guards or porters to put up the sashes after passengers have left the train. A momentary idea that something might be done to improve this state of things has no doubt crossed the minds of many while suffering the inconvenience; but that which is the business of everybody is the business of nobody, and thus the primitive glass and straps, with very slight improvements, have continued to meet the requirements of railway travellers. Mr. John Taylor, of Corporation Street, Manchester, possibly influenced by that unpleasant experience which at some time falls to the lot of every traveller, has conceived an idea, which he has patented, from which not only the travelling public but the railway service will derive great advantage. The normal condition of the present windows is open, and it is not difficult to understand the great advantages which would accrue from an arrangement by which it should close mechanically. This result Mr. Taylor has succeeded in accomplishing, and by so doing has conferred a benefit which will be readily appreciated by all classes. The window is self-closing and fits so close to the door as to prevent cold draught, and the action of the strap is exactly the reverse of that at present in use, the pull being necessary to open and not to close the window, which rises automatically immediately it is released. The invention is one which commends itself to railway companies, not only on the score of comfort for passengers, but of economy also, and the simplicity of its application makes it adaptable to private carriages, cabs, and even to dwelling-houses and public buildings, as it can be applied to existing windows at a very trifling expense. Mr. Taylor's invention is thoroughly practical, and undoubtedly one of great utility, and we shall be greatly surprised if it is not extensively adopted by the leading railway companies in the immediate future. —*Railway Times.*

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The human body contains several metals and other substances which perform important offices in the world of science. Nitrogen, carbon, and hydrogen are its chief constituents, but it holds besides about two pounds of phosphorus, upon which the health of the bones and vigor of the brain depend. This phosphorus, if extracted and put in use, would suffice for about four thousand packages of friction matches. The body also contains a few ounces of sodium, and half an ounce of potassium, which school-boys know as a curious metal that burns brilliantly on the surface of water or when touched by an icicle. In addition to sodium and potassium, there are a few grains of magnesium—enough to create a brilliant light visible twenty miles away. Who knows but some reckless chemist may undertake to drive a profitable business by extracting these valuable materials from dead bodies?

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A SHIP CANAL FOR SHEFFIELD.

Manchester leads the way, and Sheffield fain would follow. Land carriage kills the heavy trades, which cannot be retained inland unless makers have cheap and easy communication with the sea. The rail trade, once so important in the Sheffield district, has gone; and it is feared that tyres, springs, axles, and similar goods, may go also. How many people realise what was lost when the late Mr. George Wilson, with his accustomed sagacity, recognised the inevitable and initiated the bold policy of transferring the manufacture to the coast? The Dronfield Steel Works, which were the first to be moved, meant the lifting of nearly 1,000 workpeople from the Derbyshire town to the Solway shore; it represented a loss in carriage rates to the Midland Company of £100,000 a-year, and it practically paralyses the township for a time. Two thousand tons a week were turned out there; now, the bare walls are all that tell of the former busy scene which at night glared upon the Scotch express as it climbed the hill from Chesterfield. But Dronfield was only the beginning. The wages paid there would represent some £500,000 a year. Quite as much would be paid by two firms in Sheffield, and a third would represent another £500,000. Ship plates, boiler plates, and merchants' plates, which include locomotive and stationary engines, would represent another £500,000. A few ship-plates are occasionally made at Sheffield, but in the boiler-plates the

Glasgow competition is too strong. If the axle and other railway material goes, to what can we turn? It is estimated that in the various departments connected with railway work at least 4,000 hands are employed. What will become of these workpeople, and what of the shopkeepers dependent upon them for custom? The remedy is, an easy and inexpensive outlet to the sea—a canal capable of taking 200-ton ships, which would bring the raw material to Sheffield and take the finished product to the vessel in whatever port it was to be found, thus avoiding all the heavy expenses of transhipment. A waterway to Goole would effect this, and there are people sanguine enough to believe it can be done for £1,000,000. One thing is certain—unless Sheffield carves out a clear course to the sea, she must, sooner or later, say "good-bye" to most of her heavy business.—*Engineer.*

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PAPER RAILWAY WHEELS.

The paper railway wheels, frequently employed in Germany during the last six years, have called forth the following remarks from the officials of the Imperial Railway Department: For a long time paper wheels have been used upon American railways. These wheels consist of a number of layers of thick paper which are pasted one upon another under powerful hydraulic pressure until the required thickness is attained. The greater elasticity of the paper and its smaller expansibility under changes of temperature as compared with metal, led to the conclusion that the safety of railway travelling would be enhanced by the application of paper railway wheels, and that more particularly the wear and tear of the tyres would be reduced, and the motion of the carriage rendered less noisy. These theories induced certain railway authorities in Germany, subsequently to the year 1881, to carry out experiments with paper wheels. With few exceptions the wheels in question were exclusively employed under passenger carriages and sleeping cars, and in express trains, being in certain cases controlled by brakes. First of all, the excellent results obtained in America appeared to be confirmed, and no tyre breakages or accidents took place, the cause of which could be attributed to the use of these wheels. In the month of December, 1886, however, the Imperial Railway Department received information of a passenger carriage having left the lines, in consequence of the complete breaking up of its four wheels, which were made of paper, the tyres and axles being hurled under the carriage. From the appearances of the fractured wheels, it was thought that some alteration must have taken place in the structure of the material. The paper wheels used upon German railways were therefore subjected to a very narrow investigation, and numerous injuries to the material were discovered, the periphery of the paper discs being in most cases burst. The injuries had invariably taken place in wheels which were subject to the control of brakes.—*Kuhlows Trade Review.*

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SUPERHEATED STEAM.

A competent authority pronounces incorrect the current theory that superheating steam increases its pressure in pounds. It is asserted that if the steam is ordinarily dry, superheating to any temperature does not increase the temperature one ounce; in steam engines steam superheated slightly is economical, in that it maintains its normal temperature longer; that is, it does not condense so quickly, by reason of having a margin of heat above that due to its pressure, but highly superheated steam has disadvantages which are not counterbalanced. Again, it affects fibrous packings, decomposes lubricants, attacks working surfaces by drying them off so that they are apt to cut, and it has a special affinity for rusted surfaces, increasing and expediting the destruction of parts so affected most rapidly. From the instant that steam leaves the vessel in which it is generated, it commences to deteriorate in value by loss of heat; the farther it goes before reaching its work, the more it loses. Superheated, it simply supports the vitality of steam and re-enforces it.

* * *

A CAUSE OF BOILER EXPLOSION.

A very frequent cause of boiler explosion, says the *Manufacturers' Journal*, is the fact that water can be heated far beyond the boiling point, and yet not boil. Water, under ordinary circumstances, will boil at 212 degrees Fahrenheit, and will continue to boil as long as any air remains in the boiler ; but the moment the water is purged of its air by long ebullition, it becomes at rest, and the steam-gauge will not indicate any further rise of steam, as there is no further pressure upon it. Now, as the steam gauge does not indicate too much steam, the engineer will naturally suppose everything all right, he will then test the water in the boiler by pressing on the water cock or any communication with the boiler, when by doing so there is a rush of air into the boiler, the now overheated water suddenly begins to boil, and, as there is no possible escape for the immense quantity of steam so suddenly created, the result is an explosion. All this is done much quicker than it takes to tell it.

* * *

FAULTS IN CYLINDER DESIGNING.

One of the most glaring faults in the designing of steam cylinders, especially noticeable in slide-valve engines, is the envelopment of the body of the cylinder for a large portion of its circumference with the exhaust passage. Experience and theory alike point to the advantage to be gained by enveloping a steam cylinder with a jacket containing steam of a temperature higher than that of the working steam within the cylinder, and by just as much as this steam or hot air jacketing is beneficial in securing greater economy in working, by so much is an exhaust steam jacket harmful and productive of very serious loss, both directly and indirectly.

In the first place, let us consider what the exhaust from a steam cylinder really is. It is not dry steam, for if it were, its low conductive power would render it comparatively harmless. It is a mixture of steam and hot water, and the water entrained with the steam is in what may be termed a critical condition ; that is to say, it is only a trifle below the boiling point, for its pressure, that of one atmosphere absolute, and the addition of heat would raise some of it to steam again. As a matter of fact, this extra heat is very readily absorbed by the fine particles of water contained in exhaust steam, and further, it is in most cylinder designs just at hand to be absorbed.

Now the latent heat of steam is very great, and the absorption of heat from the hot wall of the cylinder by the steam escaping along the contiguous exhaust passage is something enormous, for every particle of water escaping at a temperature of 212 degrees may only be raised, it is true, to steam at 212 degrees, but the heat necessary to effect the change of condition to steam, at only the same temperature, is no less than 966 units per pound.

The cooling effect on the internal walls of the cylinder by the re-evaporation of the exhaust is bad enough, but not easy to be avoided. There is, however, no necessity to intensify the evil of cylinder condensation by the external addition of a jacket of exhaust steam, the very worst possible material. When necessary to carry the exhaust passage round or partially round the working barrel of the cylinder, a core should invariably be introduced in the casting, so as to separate the exterior of the cylinder at least one-half inch from the wall of the exhaust passage, and this core space may be either simply closed up, or if, as in a locomotive, it can be open to a hot smoke-box, it is possible that good might accrue from circulation through it of the hot gases of the smoke-box. It is bad practice to jacket a cylinder with the steam afterwards to work in the cylinder, but it is infinitely worse to jacket by exhaust steam ; better far to put a closed water jacket about the cylinder than do so.

It is nevertheless a fact, and one which has caused us much surprise, that many men who ought to be scientific engineers, considering the positions they occupy, are of the opinion that an exhaust-jacket is better than a mere air-jacket, for, argue they, is not the exhaust steam at a higher temperature than the air? They entirely overlook several points: First—That an exhaust jacket is constantly replenished with a supply of moist, wet steam at a temperature much below that of the boiler steam in the cylinder, while a closed air-jacket contains a few cubic inches of air heated up once for all. Second—That the conductivity of wet steam is enormous, and that of dry air almost *nil*, even supposing that the air-jacket received a constant fresh supply, which it does not. Third—In heating air there is no change from a liquid to a gaseous state, while in heating water until it vaporizes, the absorption of heat without change of temperature is enormous.

These facts should be carefully studied, for to neglect or ignore them means a repetition of bad design, which ought to be looked upon as a disgrace. The misfortune is that so many draughtsmen intrusted with the preparation of designs are good mechanics, rather than engineers. Every chief draughtsman should be an engineer rather than a mechanical man, and his chief assistant should be of a mechanical turn of mind. Some of the machines, as reviewed from the real machinist's view, are marred by the obvious neglect of those scientific principles, and a want of that knowledge of physics which should form a large part of the stock-in-trade of every man who aspires to call himself an engineer.

It is in physics that we generally notice the more purely practical man is wanting, and often what he does not understand he is tempted to undervalue and neglect because he sees that to carry it out might cost money. The labour involved in properly moulding a steam cylinder would be quickly repaid manyfold in the coal heap and all the contingent expenses incidental to over-consumption of coal.

Apart from the direct loss due to an exhaust-jacket, it must not be overlooked that the increase of cylinder condensation is cumulative in effect, and a very slight addition from a direct cooling cause may be the further cause of a very much greater loss in working, for the cooling of the cylinder increases the initial condensation. The increase in the water formed during each stroke again increases the cooling effect on the cylinder, and so on, until the amount of steam entering the cylinder is something enormously greater than can be accounted for by the indicator diagram.—*Railroad Gazette.*

* * *

THE LAWS OF FRICTION.

1. Friction is greatly influenced by the smoothness or roughness, hardness or softness of the surfaces rubbing against each other.

2. It is in proportion to the pressure, or load ; that is, a double pressure will produce a double amount of friction, and so of any other proportionate increase of the load.

3. The friction does not depend upon the extent of surface, the weight of body remaining the same.

4. The friction is greater after the bodies have been allowed to remain for some time at rest in contact with each other than when they are first so placed ; as, for example, a wheel turning upon gudgeons will require a greater weight to start it after remaining some hours at rest than it would at first. The cause of this appears to be that the minute asperities which exist even upon the smoothest

bodies, gradually sink into the opposite spaces, and thus hold upon each other. It is for the same reason that a greater force is required to set a body in motion than to keep it in motion. If about one-third the amount of a weight be required to move that weight along in the first instance, one-fourth will keep it in motion.

5. The friction of axles does not at all depend upon their velocity; thus, a railroad car travelling at the rate of twenty miles an hour will not have been retarded by friction more than another which travels only ten miles in that time. It appears, therefore, from the last three laws that the amount of friction is as the pressure directly, without regard to surface, time, or velocity.

6. Friction is greatly diminished by unguents, and this diminution is as the nature of the unguents, without reference to the substance moving over them. The kind of unguent which ought to be employed depends principally upon the load; it ought to suffice just to prevent the bodies from coming into contact with each other. The lighter the weight, therefore, the finer and more fluid the unguent should be, and *vice versa.*—*National Car and Locomotive Builder.*

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ELECTRICAL EXECUTIONS.

The construction of electrical apparatus by means of which criminals are to suffer the extreme penalty of the law has for some time been studied by American electrical engineers. The apparatus invented by Mr. Hayes-Garrison consists of a zinc plate upon which the condemned criminal is placed, his neck being encircled by a copper bracelet. One pole is connected with the nape of the neck, the other with the zinc plate. Pushing a button is sufficient to despatch the delinquent at once. Mr. Mender has devised a similar system; but in his apparatus the two wires which surround the head, enclosed in gutta-percha, touch the temples. M. Jablochkoff has invented an apparatus which is a kind of electrical lounge, in which the criminal is invited to take a seat, and in doing which is killed instantly. Another apparatus is a champagne bottle, which is presented to the condemned man, that he may have another good drink before being led to execution. The bottle is charged with electricity, and kills the man. Finally, there is an apparatus in the form of a bath. The condemned criminal is induced to enter a warm bath, and told to call the attendant by touching a button in the bath in case he wants anything. Of course, no towels are provided, and when on the point of leaving the bath he is obliged to summon the attendant, he presses the button, and has ceased to exist. These various apparatus were submitted to the New York State Commission, and Mr. Edison was requested to report on their efficiency. Mr. Edison is stated to have declined the request, on the grounds that, being opposed to capital punishment, he would rather employ electricity "in restoring executed men to life."
—*Iron.*

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Fellow-Members,—I have great pleasure in congratulating our Gen. Secretary and the E.C. on the valuable service rendered our Society in bringing out our *Monthly Journal*, for we have all as members long felt the necessity for one, so that we could be more in communication with each other, and better able to see the progress our Society is making, and to read the various opinions upon subjects of interest to enginemen and firemen. And I now feel it my duty as a member to bring before your notice a subject that will, I trust, receive the hearty support of all our members—viz.: We want a Widow and Orphan Fund to complete the first Society in the country for enginemen and firemen. And I would humbly suggest that all members should be asked to subscribe as follows:—Enginemen 5s., and firemen 2s. 6d. each; and if they would be agreeable to pay an additional penny per week contribution, we should be enabled to raise a sum of nearly £1,000 the first year, irrespective of donations by honorary members; but of course I should I should like to hear the opinion of the members in reference to this project, and hope that some more able pen than mine will take this matter up, and endeavour to bring it to a successful issue, for, although I have long been desirous that we should have a fund of this description, the necessity for it has been brought more forcibly to my mind in consequence of the death of our late brother member, J. P. Hall, who has left a widow and five little children to fight through the battle of life.

I beg to remain, Yours truly,
A Member of Liverpool (No. 5) Branch.

Miscellaneous.

MARRIAGE.

The genius of Milton never found a sweeter theme than the ideal marriage of our first parents in Eden, yet he who wrote so beautifully of the married state was himself the victim of an unhappy marriage. Indeed, men of genius have, perhaps, been more unfortunate in this respect than ordinary mortals, because, living on a higher plane of thought, it was more difficult for them to find a helpmate equal to themselves. The same is true, although not to the same extent, of women of genius who have married men inferior to themselves in mind, because a woman's nature has not only more endurance, but more adaptability in it than a man's. The man soon grows impatient of the conversation of a frivolous wife, especially if she disturbs his mental occupations, but the woman often feels a pleasure in the homage of a commonplace husband, if only he be an honest and considerate fellow, and with her more than with man, "pity is akin to love." Hence it is that there are probably more clever and highly gifted women who throw themselves away, as the phrase is, upon a good natured simpleton, than of talented men who fall in love with women who are not in intellectual sympathy with them.

"The world marries and is given in marriage," and the wedding bells ring on from age to age unceasingly, and yet how few who witness the life contract of brides and bridegrooms stop to consider the tremendous importance of so brief a ceremony. Upon the mental, moral, and physical qualities of the man and of the woman may depend the actions and results of actions of a succession of human beings in generations yet to come.

SWEET MINDED WOMEN.

So great is the influence of a sweet-minded woman on those around her that it is almost boundless. It is to her that friends come in seasons of sickness and sorrow for help and comfort. One soothing touch of her kindly hands works wonders in the feverish child; a few words let fall from her lips in the ear of a sorrowful sister do much to raise the load of grief that is bowing its victim down to the dust in anguish. The husband comes home worn out with the pressure of business and feeling irritable with the world in general; but when he enters the cozy sitting-room and sees the blaze of the bright fire and meets his wife's smiling face, he succumbs in a moment to the soothing influences, which act as the balm of Gilead to his wounded spirit. We all are wearied with combating with the stern realities of life. The rough schoolboy flies in a rage from the taunts of his companions to find solace in the mother's smile; the little one, full of grief with its own large trouble, finds a haven of rest on its mother's breast; and so one might go on with instances of this influence a sweet-minded woman has in the social life with which she is connected. Beauty is an insignificant power when compared with hers.

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TRAINING THE YOUTH.

While it should be remembered that the child will have childish ways, it should also be considered that youth is the time to bend the twig. How many times have you taken your child's part against the teacher, the governess, and even the father "because he is only a child?" The fact that your boy escapes punishment for bad behaviour just because "he's only a child" may give you irreparable trouble when he has grown to maturity. Better shut the little fellow up in your own closet for a few hours than have him ruined by your failure to check him in the proper way at the proper time. You should comfort your boy but not pet him; encourage when right, but reprimand him when wrong. Teach him to respect age, as well as the aged. The conduct of your child reflects like a mirror upon your own example, and for your example your parents were responsible when training you in your youth or childhood.

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TRAIN THEM AT HOME.

There are colleges for females called seminaries, where people send their daughters to get polished. They should be able to teach their children good breeding at home or give up the child raising experiment, it seems to me. The seminary system of rubbing down their scholars grinds them down pretty smooth, but unless the sparkle is deep set it is in danger of giving out before the polishing is complete. Parents who have sent their daughters to seminaries to be so polished as to be calculated to shine only in a sumptuously furnished parlour, are the ones who can't understand why young men prefer to go it alone, and can afford to spend their money playing pool rather than get married to one of their scintillating jewels. The reason is because young men can't afford to furnish the setting required for such costly ornaments, and by the time they become prepared to stand the cost the jewels are faded or are lost.

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REGULARITY OF HABIT.

One the most difficult of all the minor habits to acquire is that of regularity. It ranks with that order. "A place for everything and everything in its place" is not more important than "a time for everything and everything on time." The natural inclination of most persons is to defer until the last possible moment, or to put off till another time where this can possibly be done. Yet habits of regularity contribute largely to the ease and comfort of life. A person can multiply his efficiency by it. We know persons who have a multitude of duties, and who perform a vast deal of work daily, who set apart certain hours for given duties, and are there at the moment and attend rigidly to what is on hand. This done, and other engagements are met, each in order, and a vast deal accomplished, not by strained exertion but by regularity.

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TELL YOUR WIFE.

If you are in any trouble or quandary, tell your wife, that is, if you have one, all about it at once. Ten to one her invention will solve your difficulty sooner than all your logic. The wit of woman has been praised, but her instincts are quicker and keener than her reason. Counsel with your wife, your mother, or your sister, and be assured that light will flash upon your darkness. Women are too commonly adjudged as verdant in all but purely womanish affairs. No philosophical student of the sex thus adjudges them. Their intuition, or insight, is the more subtle, and if they cannot see a cat in the meal there is no cat there. In counseling one to tell his troubles to his wife, we would go further, and advise him to keep none of his secrets from her. Many a home has been happily saved, and many a fortune relieved, by man's full confidence in his better-half. Woman is far more a seer and a prophet than man, if she be given a chance. As a general rule, wives confide the minutest plans and thoughts to their husbands, having no involvements to screen from him. Why not reciprocate, if but for the pleasure of meeting confidence? We are certain that no man succeeds so well in the world as the man who, taking a partner for life, makes her the partner of all his purposes and hopes. What is wrong in his impulse or judgment, she will check and set aright with her almost universally right instincts. "Helpmeet" was no insignificant title, as applied to man's companion. She is meet help to him in every darkness, difficulty, and sorrow of life, and what she most craves and desires is confidence, without which love is never free from a shadow.

HATING PEOPLE.

Hate not. It is not worth while. Your life is not long enough to make it pay to cherish ill-will or hard thoughts towards anyone. What if that man has cheated you or that woman played you false? What if this friend has forsaken you in your time of need, or that one having won your utmost confidence, your warmest love, has concluded that he prefers to consider and treat you as a stranger? Let it all pass. What difference will it make to you in a few years, when you go hence to the "undiscovered country"? All who treat you wrong now will be more sorry for it than you, even in your deepest disappointment and grief, can be. A few more smiles, a few more tears, some pleasure, much pain, a little longer hurrying and worrying in the world, some hasty greetings and abrupt farewells, and life will be over, and the injurer and injured will be laid away, and ere long forgotten. It is not worth while to hate each other.

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HINTS TO EMPLOYEES.

There is only one spirit that achieves a great success. The man who seeks only how to make himself most useful, whose aim is to render himself indispensable to his employer, whose whole being is animated with the purpose to fill the largest possible place in the walk assigned to him, has in the exhibition of that spirit the guarantee of success. He commands the situation, and shall walk in the light of prosperity all his days. On the other hand, the man who accepts the unwholesome advice of the demagogue and seeks only how little he may do, and how easy he may render his place and not lose his employment altogether, is unfit for service. As soon as there is a supernumerary on the list, he becomes disengaged, as least valuable to his employer. The man who is afraid of doing too much is near of kin to him who seeks to do nothing, and was begot in the same family. They are neither of them in the remotest degree a relation to the man whose willingness to do everything possible to his touch, places him at the head of the active list.

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A FIREMAN'S STORY.

Yes, ours is a risky sort of life, as you say; you have to go at such a fearful rate now. So many signals to observe, and so much to think of, and all sorts of weather to encounter, that it tries what the strongest man is made of. But still it does not trouble me now as it used to at one time, for although I am as fond of my engine as a sailor of his ship, yet I never use to mount her at one time without thinking it would be for the last time, for I had a presentiment that I should get killed some day, for you must understand that this engine, which I have fired on for nearly eight years, has been rather an unlucky one, if you will allow me the use of that term, for she has been in one collision, killed one man, and knocked three others down, besides several other minor accidents that I will not trouble you with now. But it was the collision that gave me such a shaking and caused me to begin to think what would have become of my wife and family if I had been killed, and whilst these thoughts were passing through my mind, I came in contact with a brother fireman who was a member of the A.S.L.E. & F., who speedily noticed my downcast appearance, and asked me the cause of it, and after telling him of the concern I had for my wife and family, should anything befall me, he said, well, why not join our Society, and in doing so you will not only be making preparation for your wife and family in the event of your death, but you will be preparing for sickness, old age, incapacitation, and securing protection for your labour, &c. It did not take me long to make up my mind, I can assure you; and now, no matter what may come, I know my wife and family will not have to go to the workhouse should anything befall me, and I feel more secure than I did formerly, knowing that I have made these preparations, and I am astonished that I did not see things in a different light before. And since I have been a member I have tried all I knew to induce others to join our ranks, in many instances I have been successful, but in others I have been met with the answer, "I cannot afford it," but there's an old saying "Where there's a will there's a way," and surely any engineman or fireman receiving regular wages as we do could afford to join us. Many a man besides myself regards the Society as one of their best friends, knowing that it will prevent the home being broken up on the death of the bread winner. It is all very well when the grim monster Death steals away the husband and father, for relatives to cluster round and tell the bereaved ones that he is better off, forgetting the struggle which those who are left behind will have to endure, in fighting their way through life.

But some people say, "Oh, trust in providence, and you will be all right." I say trust in providence also, but I say in addition to trusting in providence, join our Society, for God helps those who help themselves.

I am, yours, &c.,
F. R.

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Reading, *February* 28*th*, 1888.

A meeting, which was fairly attended by enginemen and firemen belonging to S.E.L. & S.W. & G.W. Railways was held at the Blagrave Arms on Sunday, February 26th, Mr. T. Ball, Organising Sec., and representatives from some of the London branches were present. Mr. Ball addressed the meeting in splendid style. He explained the objects of the Society in detail, the advantages and benefits to be derived from it. He then went on to show in a very able manner how necessary it was that all enginemen and firemen should become members of the Society. A branch of 25 members was then successfully opened. The next meeting will be on Sunday, March 11th, when several others are expected to become members.

F. R.,
Secretary, Reading Branch.

Interesting Extracts.

OBEYING ORDERS.

Frederick the Great, whose brilliant victories elevated Prussia from an inferior to a superior position among European nations, was noted for the strictness of his military discipline. He trained his army to move like a machine. His soldiers were disciplined so to obey orders that they had no will of their own.

The discipline which the great Federick stamped upon the Prussian army remains to-day, in all the clearness of the original impression. Not long ago, a little event took place at Powdowsk, a military station near Berlin, which shows what is the German soldier's idea of obeying orders.

The officer in command one morning posted a veteran in front of his own residence, with orders to pace up and down a certain distance, and on no account to lower his gun from the "carry." The officer, a pompous, self-important man, was expecting visitors that day, and he wished to impress them with his military style. Calling the soldier before him, he gave his orders.

"You are to pass the distance assigned with the gun at the 'carry.' Do you understand?"

"Yes, commander."

"On no account are you to deviate from your walk, or remove the weapon from its position. You understand?"

"Yes, commander."

"You will observe strict silence. On no account are you to speak with any one on your beat. Do you understand?"

"Yes, commander."

"Very well, go and obey!"

An hour after, the officer's guests were ushered in his presence. They entered each with a broad grin on his countenance.

"My friend," asked one of them of the host, "what is this procession in front of your house?"

,,Procession! Procession! There is no procession!" blurted out the host, growing red in the face.

"But look for yourself."

The commander rushed to the window. There was the soldier, as stiff and erect as his own weapon, with eyes stolidly staring right ahead, marching solemnly up and down his beat, while following him was a mob of young street loafers, armed with old brooms, sticks, pitchforks, and other improvised weapons. Seeing that the soldier was apparently oblivious to all around him, one bold scamp had affixed to the sentinel's coat-tails a string, at whose end dangled a rusty tin can. And this unique procession had been going on for half-an-hour, to the intense delight of the populace in the street and the edification of the guests when they arrived.

Out rushed the irate officer. The mob, seeing him, dispersed, and he began to vest his anger on the sentinel.

"Idiot! Blockhead! Senseless! Why did you not strike them down, disperse them?"

"The commander forgets. I had orders not to remove my gun from position."

"True! I am a fool! but you might have ordered them off."

"The commander, pardon me, forgets again. I had orders not to speak."

"It is true. But—

"There is no but. You ordered. I obeyed. What more can be said?"

Indeed, nothing could be said. The officer swallowed his wrath as best he could. It would be altogether unmilitary to punish a soldier for obeying orders.

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PEOPLE PUNISHED BY THEIR OWN INVENTIONS.

Perillos, who invented the atrocious idea of a furnace in the shape of a brazen bull for the cremation of live criminals to gratify a whim of the tyrant of Agrigentum, was the first person baked to death in the monster of his own creation.

The regent Morton of Scotland, in the reign of Queen Elizabeth, invented the "Maiden," a sort of guillotine, for capital punishment, and the first head which was severed by the awful instrument was his own.

Aubriot, a provost of Paris, who designed and built the "Bastille," was the first person imprisoned in the impregnable fortress, having been convicted on a charge of heresy.

The Bishop of Verdun, who invented the torturing "Iron Cage," too small to allow the wretch confined in it to stand upright or lie at full length, was the first to be shut up in one, and Cardinal Balne, who recommended its use to Louis XI., was confined in one for upwards of ten years.

That most horrible form of human torture known as the "Iron Shroud," was the invention of one, Ludovico Sforza, who was himself the first to suffer death by the ghastly instrument.

The sacred narrative of Haman, the Jew, who died on the gallows he erected for Mordecai, has a parallel in modern history in the case of Maringi, Minister of Finance to Phillippe the Fair, who was hung on a gibbet which he had caused to be erected at Montfaucon for the execution of certain felons.

The Marquis of Worcester, a prodigy of inventive genius, devised among his many inventions, a "lock having a steel barb, which would dash forth and catch a burglar attempting to open it by the hand, and catch him as a trap catcheth a fox." The poor Marquis himself, while testing his new lock, was "caught" most severely.

Captain Coles, the inventor of the iron turret ship, perished in one of them off Cape Finisterre, in September, 1870.

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SLEEP DURING "THE HOURS OF FATE."

The room in which the enfeebled person has been sitting before going to bed has been warmed probably up to summer heat; a light meal has been taken before retiring to rest, and then the bedroom is entered. The bedroom, perchance, has no fire in it, or if a fire be lighted provision is not made to keep it alight for more than an hour or two. The result is that in the early part of the morning, from three to four o'clock when the temperature of the air in all parts is lowest, the glow from the fire or stove which should warm the room has ceased, and the room is cold to an extreme degree. In country houses the water will often be found frozen in the hand-basins or ewers under these conditions. Meanwhile the sleeper lies unconcious of the great change which is taking place in the air around him. Slowly and surely there is a decline of temperature to the extent, it may be, of thirty or forty degrees on the Fahrenheit scale; and though he may be fairly covered with bedclothes he is receiving into his lungs this cold air, by which the circulation through the lungs is materially modified. The condition of the body itself is at this very time unfavourable for meeting any emergency. In the period between midnight and six in the morning, the animal vital processes are at their lowest ebb. It is in these times that those who are enfeebled from any cause most frequently die. We physicians often consider these hours as critical, and forewarn anxious friends in respect to them. From time immemorial those who have been accustomed to wait and attend on the sick have noted these hours most anxiously, so that they have been called by one of our old writers, "the hours of fate." In this space of time the influence of the life-giving sun has been longest withdrawn from man, and the hearts that are even the strongest beat then with subdued tone. Sleep is heaviest, and death is nearest to us all in "the hours of fate." The feeble, therefore, are most exposed to danger during this period of time, and they are most exposed to one particular danger, that of congestion of the lungs, for it is the bronchial surface of the lungs that is most exposed to the action of the chilled air; and, in the aged, that exposure is hazardous.—*Dr. B. W. Richardson.*

PAGANINI, THE GENIUS.

A young man who has imbibed the notion that he is a genius is apt to lose his balance. The flattery of friends makes him so vain that he imagines that he, at least, may attain without labour. He ignores mental discipline, because it involves hard study. He trusts to his genius to push him up, and sinks.

Scores of young men go to pieces at the beginning of the voyage, when they might have entered port with every sail drawing had they taken their departure from Carlyle's definition of genius: A capacity for infinite painstaking.

All Europe hailed Paganini as a genius. During forty years he reigned the monarch of the violin, with no rival near his throne.

If any one was ever born a violinist, he was. As soon as he could hold the violin he began to play it. The worshippers in the churches of Genoa often looked towards the choir to see a child playing on a violin almost as large as himself.

His genius was phenomenal. It gave him capacity, and urged him to develop it by intense application. His precocity astonished those from whom he sought instruction; but they were amazed at the zeal and rapidity with which he worked at their lessons. He soon exhausted their ability to instruct, and so passed on from one great teacher to another.

He went to Rolla, the great musician of Parma. The master was ill in bed, and Paganini waited in the ante-room. Some sheets of difficult music were lying on the table, alongside of a violin. The boy looked at the music, and began playing it.

"Who is the great master playing in my ante-room?" asked Rolla, raising himself to listen.

"A mere boy! impossible!" he exclaimed on being told that the player was a mere lad, who wished to become a pupil.

When Paganini appeared before the invalid's bed, the master said, "I can teach you nothing."

The boy had practised ten or twelve hours a day. He would try passages over and over again in different ways, with such perseverance that at nightfall he was exhausted by fatigue. He composed as well as practised, writing music so difficult that he could not play it until he had mastered it by incessant practice.

Let the reader note the working of the boy's genius. It prompted him to compose a hard task to be mastered by himself. It kept him up to his work day after day, until he had mastered the task. The boy had a capacity for infinite painstaking.

The boy's genius made him thorough. Farraday used to begin his investigation of a phenomenon by learning all that other scientists had written about it. With similar thoroughness young Paganini acquired the knowledge of what other violinists had done or left undone.

He would have knowledge as well as art, so that he might not fail through ignorance or plagiarism. He worked hard to produce new effects and combinations. He sighed for a new world, because he had explored the old. His explorations gave him his point of departure. He sailed from it and discovered a world in which he had no master, no equal, and no follower.

His art was born with him, but he developed it by study and practice. When he died, men said he had carried his secret with him to the grave. It may be so; but the intelligent reader of his life discerns that Paganini's ability to master details accounts in part for his success.

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LONDON COAL TRAFFIC.

According to the *Colliery Guardian*, the tonnage of coal brought into London by the various railways during the years 1886 and 1887 was as follows:—

	1886-tons.		1887-tons.
Midland	2,38[illegible],[illegible]82	....	2,42[illegible],251
North-Western	1,680,871	....	1,6[illegible]6,[illegible]66
Great Northern	1,237,[illegible]6[illegible]1	....	1,[illegible]03,158
Great Western	8[illegible]0,857	....	839,3[illegible]8
Great Eastern	889,100	....	849,984
Other lines......	104,118	....	1[illegible]4,524
	7,118,179		7,317,081

ANCIENT SHIP RAILWAY.

The ancients were familiar with appliances, the which have not all come down to us, for transportation of great masses of material. Herodotus, for instance, describes "a monolithic temple," estimated at 5,000 tons in weight, which he supposed was carried the whole length of the Nile (2,800 miles) to its present position at the Delta. According to the *Encyclopædia Britannica*, "the city of Corinth enjoyed in prehistoric times two advantages especially important in the infancy of navigation. On the long gulf which stretches from Corinth westward, vessels could sail for above 100 miles without losing sight of land; and secondly, the natives of Corinth were skilled in dragging vessels of all kinds across from sea to sea, thus saving them the dangers of a perilous voyage around the Peloponnesus." This was a portage over the same ground where subsequently the Athenians (550 years B.C.) built the "Dioclus," a veritable ship railway, of polished granite, provided with suitable cribs and rollers, which they operated for 300 years. The distance from Corinth to Athens in a direct line was less than 50 miles, while the route by the sea was something like 500, and as the navigators of that period generally made it by hugging the shore, it was considerably more. The wars in which Athens found herself engaged at this period of her history necessitated the building of what in those days were immense ships of war. A reliable authority gives their average dimensions as follows: Length, 149 ft.; beam 18 ft.; draught, 8½ ft.; height above the water line, 11 ft. They were propelled by long sweeps in three banks, one above another, and by sails supported by two or three masts, one of which was square-rigged, and the others provided with lateen sails. The measurement of these war ships was 232 tons gross register, and their displacement weight must have been at least 450 tons. The exigencies of war frequently required these vessels to be transported over the Corinthian isthmus by means of the "Dioclus," to which I have referred, the maximum elevation to be overcome being

259 ft., speed and safety being matters of prime necessity. The Turks in the Middle Ages were known to have transported their war ships overland, and the king of Sweden constructed a ship railway between Stromstad and Idelfjal, over which he transported several war ships. But the most successful and formidable expeditions ever undertaken for the transportation of heavily freighted vessels overland were those of the Venetian Republic in 1438-9, under the engineer Sorbolo.—*Harper's Magazine.*

WHAT AN EGG WILL DO.

For burns and scalds nothing is more soothing than the white of an egg, which may be poured over the wound. It is softer as a varnish for burns than collodion, and, being always at hand, can be applied. It is also more cooling than sweet oil and cotton, which were formerly supposed to be the surest application to allay smarting pain. It is the contact with the air which gives the extreme discomfort experienced from the ordinary accident of this kind, and anything that excludes the air and prevents inflammation is the thing which should be at once applied. The egg is considered one of the best remedies for dysentery. Beaten up slightly, with or without sugar, and swallowed at a gulp, it tends, by its emolient qualities, to lessen the inflammation of the stomach and intestines, and by forming a transient coating of these organs, to enable nature to resume her healthful sway over a deceased body. Two, or at most three eggs per day would be all that is required in ordinary cases; and since egg is not merely a medicine, but food as well, the lighter the diet otherwise and the quieter the patient is kept, the more certain and rapid the recovery.

THE ORIGIN OF SEXES.

Aristophanes gives the following myth:—Once upon a time man had three sexes and a double nature; besides this, he was perfectly round, and had four hands and four feet, one head with two faces looking opposite ways, set on a single neck. When these creatures pleased, they could walk as we do now, but if they wanted to go faster they would roll over with all their four legs in the air like a tumbler turning somersaults; and their pride and strength were such that they made war upon the gods. Jupiter resented their insolence, but hardly liked to kill them with thunderbolts, as the gods would then lose their sacrifices. At last he hit upon a plan. "I will cut them in two," he said, "so that they will walk on two legs instead of four. They will then be only half as insolent, but twice as numerous, and we shall get twice as many sacrifices." This was done, and the two halves are continually going about looking for one another; "if we mortals," says Aristophanes, with an air of apprehension, "are not obedient to the gods, there is a danger that we shall be split up again, and shall have to go about in basso-relievo, like those figures with only half a nose which you may see sculptured on our columns."

A LEARNED JUDGE.

A distinguished literary man of Oakland stood up in the police court to answer to the usual charge of vagrancy. "I object, your Honor," he said with dignity, "to this persecution of gentlemen who follow the profession of letters, and—" "I understand," interrupted the Judge, "that you were found sleeping on a doorstep, that you have no visible means of support, and that you have been seen under the influence of liquor." "What of it?" cried the prisoner. "Though I am as poor as Richard Savage when he made his bed in the ashes of a glass factory; as drunken as Dick Steele, who was full nine-tenths of his time; as ragged as Goldsmith when he was on his fiddling tour; as immoral as Byron; as dirty as Sam Johnson; as ——" "There, there," cried his Honor impatiently, "I've no doubt your associates are a disreputable lot, and I shall deal with you in such a manner as to cause them to give Oakland a wide berth. Sixty days with hard labour. Mr. Clerk, furnish the constables with the names of the vagabonds mentioned by the prisoner."

AN ECONOMIC RAILWAY.

Probably the most economically managed railroad in the world is in Ross County, Ohio, and is known by the corporate name of the Cincinnati, Hocking Valley, and Huntington Railroad. It is only ten miles in length, and was organised and built mainly by John Karshner, a wealthy farmer. When the road was built he sold the crops of his farm for one year, and bought a locomotive which he called the John Karshner. Then he had to build a combination passenger and baggage car, and his equipment was complete. He has been operating his road for two years. At first he employed a conductor, and a freight agent, and followed the custom of larger roads. But being an active man, though over seventy years of age, he soon dispensed with all superfluous services, and he now combines within himself the entire list of railroad men, from owner and president to conductor and brakesman. His train goes twice a day from Adelphi to Kingston and returns. It will stop on signal at any farmhouse or cross road for passenger's freight. Mr. Karshner goes on every train as conductor, brakesman, baggage-master, mail and express agent, and even as news-agent. He sells no tickets, has no running arrangements with other roads, has no running account for freight, passengers, or express. Everything is cash. He does not require a book-keeper nor even a clerk.

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TO SOFTEN THE HANDS.

A little ammonia or borax in the water you wash your hands with, and that water just lukewarm, will keep the skin clean and soft. A little oatmeal mixed with the water will whiten the hands. Many people use glycerine on their hands when they go to bed, wearing gloves to keep the bedding clean; but glycerine makes some skins harsh and red. These people should rub their hands with dry oatmeal and wear gloves in bed. The best preparation for the hands at night is white of egg, with a grain of alum dissolved in it. "Roman toilet paste" is merely white of egg, barley flour, and honey. They say it was used by the Romans in the olden time. Anyway, it is a first-rate thing; but it is a mean, sticky stuff to use, and does not do the work any better than oatmeal. The roughest and hardest hands can be made soft and white in a month's time by doctoring them a little at bedtime; all the tools you need are a nail brush, a bottle of ammonia, a box of powdered borax, and a little fine white sand to rub the stains off, or a cut of lemon, which will do even better, for the acid of the lemon will clean anything. Manicures use acids in the shop, but the lemon is quite as good and isn't poisonous, while the acids are.

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APOSTROPHE TO WATER.

Taking in his hand a glass of water, Mr. Gough exclaimed: "Did you ever feel the tongue dry, the lips parched, and the throad feverish, and then, bringing a goblet filled with pure water to your lips, do you remember the sensation as it trickled over your tongue and gurgled down your throat? Was it not a luxury? Surely, it is a luxury to quench thirst in pure spring water. Here is a beverage brewed for us by our Heavenly Father—brewed, too, in beautiful places, and not amid the smoky fires, the horrid stench, and rank corruption that fester around the brewhouse or distillery. Our Father brews a drink for His own children in lovely places, down in yon grassy dell, where the red deer wanders and the child loves to play; down there, where the brooks murmur and the rills give out their music; there He brews pure water, far away on the mountain top, whose granite peak glitters like gold in the sunlight; away again, on the wide wild sea, where the hurricane howls its mournful melody, and the storm sends back the chorus, sweeping the march of God!

"There brews He the beautiful water! And beautiful it always is! You see it glistening in the dewdrop; you hear it singing in the summer rain; you see it sparkling in the ice gem when the trees seem loaded with rich jewels! Look at it as it glitters in the hoar frost on which the sun is shining! Beautiful water!—dancing in the hailstorm, leaping, foaming, dashing in the cataract, sparkling in the fountain!

"Beautiful water! See how it weaves a golden gauze for the setting sun, and a silvery tissue for the midnight moon! Watch it descending in the feathery snowflake, or painting with fairy pencil flowers and leaves upon the window pane, or covering with a mantle of white the wintery world! Look at it as it trickles down the mountain side, like silver ribands, mixing with the heather bloom! Mark it settling on the mountain top, till it seems as if it lifted up its glorious face to kiss the very heavens! Beautiful water!—rolling up the valley in the cloud mists, or weaving the gorgeous rainbow, its warp, the raindrop of the earth; its woof, heaven's bright sunbeam!

"Beautiful water! There is no blood stain in its crystal depths, no madness and no murder in its foam! It never broke a mother's heart; it never ruined a reputation; it never sent a poor wretch shrieking to the gallows. No poison bubbles on its brink! Never did pale-faced wife, or starving child, or broken-hearted mother weep into it a bitter tear; never did drunkard howl back from his death-bed a fearful curse upon it! There is no curse here. Sing songs of ruby wine if you will; hand round your goblet if you choose; but

'Give water to me, bright water to me:
It cooleth the brow, it cooleth the brain,
It maketh the weak man strong again.'

"Young women, in the glory of your womanly beauty, speak out and tell us; young men, in the majesty of your intellectual power, stand up and tell us. Have we not common sense on our side when we would dash from the lips of the young for ever the drink that debases and degrades, and give them as their best and purest beverage the gift of God, brewed in beautiful places for His children Because our principle is lawful, and good, and expedient, and reasonable, and sensible, I say we shall succeed. I shall not live to see it, but when I die I pray God that it may be in harness, battling for the cause with Excelsior! for my motto, in the hope that a better day is coming, and in the humble reverent faith that God will speed the right."

J. B. Gough.

CURIOUS SIGNBOARDS: SAINTS, MARTYRS, &c.

The names of saints were once very commonly utilised for signboards. Many of these saints were supposed to be the patrons of particular trades, and were constantly adopted as the signs of those who followed them. Thus "St. Crispin" was generally a shoemaker's sign. At the present day the gentle craft represented by this saint live up to the proverb, and keep to the "Last," but many publicans still have the sign of "Crispin," "Saint Crispin," "Jolly Crispin," or "Crispin and Crispian," and occasionally "King Crispin." And well may they put their houses under the protection of this saint, since the proverb says cobblers and tinkers are the best ale drinkers. Crispin and Crispian were two Roman brothers, sons of a king. They travelled to France to preach Christianity, and worked at the trade of shoemakers, making sandals for the poor, which they gave away; the angels, says tradition, supplying them with leather. Hence they are considered the patrons of shoemakers. They were beheaded at Soissons in 308. What may have contributed to their popularity in this countary is the fact of the battle of Agincourt having been fought on their day, October 25th, 1415. The "St. Hugh's Bones" was another sign of the gentle craft. St. Hugh was a prince's son, deeply in love with a saintly coquette called Winifred. Having been jilted by this lady in a very pious manner, he went travelling, resisted the temptations of

Venus, like another St. Anthony, passed through numberless adventures, and was finally martyred in the reign of Diocletian by being made to drink a cup of the blood of his lady-love mixed with cold poison, after which his body was hung on the gallows. Among other misfortunes in his travels he was shipwrecked and lost all his wealth, so that he had to choose a profession, which was that of a shoemaker, and so well he liked his fellow-workmen that having nothing else to give he bequeathed his bones to them. After they had been well picked by the birds, some shoemakers took them from the gallows and made them into tools, and hence their tools were named "St. Hugh's Bones." "Bishop Blaize," or "Blaze," otherwise "St. Blasius," is another patron of a trade to be met with on the signboard. This worthy Bishop of Sebaste is considered the patron of woolcombers, whence the sign is very common in the clothing districts. He is represented with the instrument of his martyrdom in his hands, an iron comb with which the flesh was torn from his body in 289. From this implement there has been attributed to him the invention of woolcombing. His holiday is celebrated every seventh year by a procession and feasts of the masters and workmen of the woollen manufactories in Yorkshire and Bedfordshire. In sheep-shearing festivals, also, a representation of him used to be introduced. A stripling in habiliments of wool was seated on a milk-white steed, with a lamb in his lap, the horse, the youthful bishop, and the lamb all covered with a profusion of ribbons and flowers. "St. Julian," the patron of travellers, wandering minstrels, boatmen, &c., was a very common inn sign, because he was supposed to provide good lodgings for such persons. Hence, too, St. Julian's Crosses in Saltire are in many of the innholders' arms, and the old motto was :—"When I was harbourless ye lodged me." St. Martin's character as a saint was not unlike St. Julian's; hence we find him frequently on the signboard—the most favourite representation being the saint on horseback cutting off with his sword a piece of his cloak in order to clothe a naked beggar.

HOW KING'S CROSS GOT ITS NAME.

The name of "Battle Bridge" is well-nigh forgotten, and "King's Cross" reigns in its stead. Yet how few Londoners of the present generation know whence the name is derived! If they ever trouble their heads about it at all they probably imagine that it was a cross, like the Eleanor crosses, raised to the memory of some king. And what king, think you, was it intended to keep in perpetual remembrance? None other than his Most Gracious Majesty King George the Fourth, of pious memory. Why this monument was raised I have never been able to learn, unless it was to celebrate his death, which took place in 1830, and probably to hold up his many virtues, as bright exemplars, to ages yet unborn; but a mad fit came over the inhabitants of Battle Bridge. and the hideous structure arose. It was all shoddy; in the form of an octagon building ornamented with pilasters, all substantially built of brick, and covered over with compo or cement, in order to render it more enduring. It was used as a police-station, and afterwards as a public-house, whilst the pediment of the statue was utilised as a camera obscura. I don't think they knew exactly what they were about, for one party wanted it to be called Boadicea's Cross; another went in for it being nationally named St. George's Cross; but the goodness of the late King was more popular, and carried the day, and we now enjoy the *nominis umbra* of King's Cross instead of the old cognomen of Battle Bridge It had a very brief existence. It was built between 1830 and 1835, and was demolished in 1845; the stucco statue only having been *in situ* for 10 years. It is said that the nose of this regal statue had for its base an earthern draining tile, and that it was offered to a gentleman for sixpence! . . . Close by here, in Gray's Inn Road, was a mountain of refuse and dust; but it was as profitable as were the heaps of Mr. Boffin in Charles Dicken's "Our Mutual Friend." This mound once had a curious clearance, so it is said. It was bought in its entirety, and sent over to Russia to help to make bricks to rebuild Moscow; and the ground on which it stood was in 1826 sold to a company for £15,000—*Mr. J. Ashton's "The Fleet."*

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THE WATER WE DRINK.

wonder how many, out of the busy multitudes of people traversing our snow-clad streets, or gazing upon the white mantled fields, during the late falls of snow, ever considered where the snow came from, or how it came to give our dusty world such a bright and novel aspect. Beautiful as the snow-flakes appear as they tumble down in gay succession through the air, persons who have only thus seen them have only seen a very small part of their beauty. If a snow-flake be placed under a powerful magnifying glass you will see a heap of exquisite starlike crystals piled over one another, whose elegant and varied forms language would fail to describe. Some are like wheels with feathered projecting spokes, others imitate crosses of marvellous sculpture, others, kaleidoscopic combinations of fern fronds, hexagons, triangles in endless diversity; indeed, the difficulty is to find any two crystals alike. But notwithstanding the immense and countless differences of detail, all snow crystals are reducible in essential arrangement, to a system known amongst chemists as the hexagonal. Snow is only one of the many forms assumed by the water we drink. Like many other substances water can exist either as a gas, a liquid, or a solid, *e.g.*, steam, water, ice. I have heard many people say, when the kettle has been boiling, "the steam is coming from the spout," thereby meaning the little puffs of vapour so familiar to us; but in reality this is not steam at all, for steam is invisible, and if you were to be shown a glass tube filled with steam it would appear to be perfectly empty. We might say that liquid water is the great vehicle of all life. Certain it is that water forms the greater part of the weight of all living things, whether vegetable or animal. If you take 100 parts of butcher's meat you would find after examination that 74 parts, or 74 per cent. consisted alone of water, leaving a residue of only 26 per cent. solids. But there are some marine creatures popularly though erroneously called jelly fishes, in whom the proportion of water may even exceed 90 per cent. Also, unless the food eaten by an animal becomes completely dissolved in the alimentary canal, it cannot be appropriated into the system; in truth, the ultimate end of digestion may be said to be the solution of the food in watery liquid, so that it may become capable of transuding through the membranous walls of the blood vessels and absorbents into the circulation. Without water plants soon become flaccid, and droop and wither; animal tissues, such as muscle, and brain, and heart, speedily loose the ability of carrying out their natural functions, and the vital processes cease. We see, therefore, what an essential and integral part of every organism water is. Chemistry demonstrates that water is not a simple element or substance, but is composed of the two gases, hydrogen and oxygen, in combination. This can be proved in two direct ways; first by decomposing water into its two constituents by an electric current, or by passing it through a red-hot iron tube; secondly, by manufacturing water through artificial combination of the two gasses in a vessel. When hydrogen is burnt in the presence of oxygen an explosive combination occurs, and water is the result.

Every one is aware how clouds arise, by evaporation from the earth's surface. They consist of extremely minute globules of water, so light as to float in the atmosphere. When, however, the air becomes very cold, these little droplets run together, and thus constitute large drops, which being so much heavier, fall to the ground in the form of rain. Should the air become exceptionally cold, the partially condensed cloud particles, instead of making rain-drops, crystallise into the delicate structures already referred to, and the singular crystals becoming entangled among each other, descend as the fleecy snow flakes. Nobody can explain how these crystals are made, or the reason why a drop of water should, under certain conditions, arrange itself into the most intricate and beautiful geometrical shapes. The phenomenon of crystallisation may be easily watched by dissolving a little common salt in water, and placing a drop on a glass slide. On looking at the slide through a microscope nothing will be seen at first, but in a few moments small crystals of square outline will appear, then larger ones, and so on, until the whole field of view is strewn with crystals. Some philosophers imagine that crystals must be classed as the connecting links between the living and non-living worlds, or to speak more truthfully, as transitionary forms, between organised and inorganic structures. Let us suppose that some clouds are floating high up in the atmosphere and that a sudden fall in the temperature produces rain-drops, and let us further suppose that these rain-drops in falling to the earth have to pass through a still colder layer of air. The consequence will be that, if this latter be sufficiently cold, the rain-drops will be frozen, and will fall in the shape of hailstones. Thus we learn that clouds, rain, snow, and hail, are but natural forms assumed by water, and depending in each case chiefly upon the atmospheric temperature. Every schoolboy is informed of the preponderating proportion of water borne to the solids of our planet, at least as regards the surface, and according to the Mosaic cosmogony there was a period when the whole globe was wrapped round in one continuous sheet of ocean. Water has also played a vast part in the moulding of the earth's physiognomy; the scooping out of valleys, the formation of river beds, the transportation of rocks and boulders, by the movements of glaciers and ice. A constant circulation of water is taking place all over the world. The burning sun shining upon the bosom of the Tropical oceans is steadily but surely abstracting from thence vast volumes of moisture, and these wafted along in the form of clouds, it may be until interrupted by some range of hills or mountains, are there condensed, and are deposited to feed the springs of the rivers. The rivers hurry away the water back again to the deep, and so all the rivers run into the sea, yet the sea is not full: "Unto the place from whence the rivers come, thither they return again." Water, as we all know, is the natural home of many creatures. Some readers will perhaps have seen at exhibitions, &c., what purported to be the animalcular inhabitants of the water we drink, and the uninitiated, after gazing at these, might well be excused if he should afterwards hesitate to take a glass of cold water. But ordinary water taken from a tap contains no living things whatsoever, no matter however high may be the magnification to which it is subjected. If such water were to be allowed to remain for a day or two, a film of living *microbes* would appear on the surface, but these are so extremely small as to be imperceptible in ordinary microscopes. The creatures seen at exhibitions frequently, far from being animalcules at all, may be little crustaceans, aquatic insect larvæ, &c., fished out of ponds and streams. The value of water in its scientific applications to civilised life, who can estimate? Think of all the work done every day by the power of steam! of the enormous expenditure of energy, in the conveyance of goods by locomotives; of the manufacture of fabrics, the working of iron and steel, and the vast multitude of processes everywhere in operation in connection with the arts. Now, all these wonderful results simply depend upon the fact that water may be easily converted from the liquid into the gaseous condition, and *vice versa*. The essential motor part of all steam-engines is an iron box with certain apertures in its side, and free to move up and down in this box a metal plate. Now let some steam or water gas enter an aperture below the moveable plate, and the plate will be raised to the top of the box; and, if then, this steam be condensed into water by the application of cold air, or otherwise, the metal plate will fall to the bottom. The metal plate or piston, as it is called, being fastened to a rod, the up and down motion is utilised by various mechanical devices for rotating wheels, &c. It must be remembered that steam sufficient to fill a large space, when converted into water, would only compose a few little drops, hence its utility. The part played by water in the world's economy will thus be seen to be one of first importance. Without it the earth would be one dreary, inhospitable waste; the sky would be clear and cloudless; there would be no living creatures, either plant or animal; in short, it would be with the earth, as is reported of our cold, barren satellite, the moon. This common and simple liquid is at once the great medium in a large bulk of natural phenomena, and a vast agent in the progress and achievement of civilization.—*Nottingham Express*.

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A LOCOMOTIVE SWALLOWED BY A QUICKSAND.

"In the construction of the Kansas Pacific and Atchison, Topeka and Santa Fe Railroads," said H. L. Carter, a railroad contractor of St. Joseph, the other day, "one difficulty of frequent occurrence was met with, which, as far as my experience goes, is unique in railroad history. I refer to the trouble arising from quicksands. From Western Kansas to the mountains, quicksands are to be found in nearly every stream no matter how small, and to successfully bridge them required an expenditure out of all proportion to the size of stream to be crossed. We tried pile-driving, but the longest piles disappeared without touching bottom. Then filling with earth and stone was attempted, and met with equally poor success, as the quicksand was apparently capable of swallowing the entire Rocky Mountains. The only means of crossing a quicksand was found to be to build short truss bridges across them. This was very expensive, but was the only thing to be done. As an instance of the praticallybottomless nature of the quicksands, I may cite the case of an engine that ran off the track at River Bend, about 90 miles from Denver, on the Kansas Pacific. The engine, a large freight, fell into a quicksand, and in twenty minutes had entirely disappeared. Within two days the company sent out a gang of men and a wrecking train to raise the engine. To their surprise they could not find a trace of it. Careful search was made, magnified rods were sunk to the depth of 65 ft., but no engine could be found. It had sunk beyond human ken, and from that day to this has never been discovered.—*Wichta Beacon.*

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BURMESE RAILWAYS.

The annexation of Burmah has given rise to considerable expectation that a vigorous policy would be adopted for the purpose of opening up the country and bringing ourselves nearer to the markets of China. There have been schemes propounded for new railways and improved roads, but if the proposed enterprises are to be worked in the same fashion as those existing in British Burmah, they will fail of a great deal of good which was reasonably expected from them. The Burmese railways are perfectly overgrown with officialism, and are worked, apparently, according to a system which has been evolved without any reference to the needs of the country. One of the leading trades of the district is the export of timber, and consequently it would be imagined that rolling stock had been provided for its accommodation. But we hear of logs lying at railway stations waiting for trucks for many months before they can be moved; and this not at remote up-country stations, but within 40 miles of Rangoon itself. How can the trade of a country increase when the capital of merchants is locked up in this fashion, and the whole course of their trade is dislocated? The line has been open for years, and all the time the same difficulty has been felt, but apparently no effort is made to remove it. The timber is cut in the forests, and is then dragged through a difficult country, often without roads, to the railway, and then the real struggle begins. The former part of the work is regarded as child's play in comparison to the latter. The passenger traffic is organised on one half of the lines in the same how-not-to-do-it fashion. People naturally desire to travel in the night, in order to avoid the fierce heat of the sun; but they are told that such a course is not feasible until the line has "settled." As the line has been constructed for some years, and as night trains are run for goods, it is difficult to see what settlement could possibly take place which would endanger the safety of a passenger train. On another line, which has just been opened, the only device by which a man can be carried is to buy some bags of rice and despatch them as freight. He then gets a free pass to accompany his rice! Passengers, as such, are not yet carried, but the astute native manages to make whatever journeys he requires by attaching himself to a small consignment of grain. The cause of the inefficient management of the railways in Burmah probably lies in the fact that they pay 4 per cent. This satisfies the official mind, and causes it to look upon all innovations with disgust. If a higher dividend were paid, the authorities at Calcutta would expect it to be maintained, and if it fluctuated would institute inquiries which would be irksome. As matters stand everybody is satisfied except the public—those for whose benefit the line was created.—*Engineering.*

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Humorous.

LOST BAGGAGE.

"Very well, madam. We will begin our search in division 'A.' Were both handles off your satchel, the bottom partly ripped off and a red woollen rag sticking out of the side?"

"No, sir."

"Ah! then I missed it. Let's see; here's a satchel which has been here about four weeks. The first thing on top is a red wing and a pair of blue stockings."

"That isn't mine, sir."

"Just so. Belongs to some poor soul who can't be happy without it. Here's a satchel that bears your description, but it can't be yours. The principal contents are a bottle of poor whisky, an old hat, and a dime novel. Can't belong to you, nohow?"

"No, sir."

"Well, here's another bundle. I should say by the feel that it contained two nightcaps, a volume of poetry, and a set of false frizzes. Do you identify it?"

"No, sir; I don't."

"Does this satchel resemble yours?"

"Yes, sir."

"Any familiar marks about it?"

"Yes, several."

"Did your satchel contain a package of sixteen love letters, each one leading off with 'Dear Ben,' and closing with 'Your own darling'?"

"No, sir—no, sir—that isn't mine."

"This one isn't yours either, because it contains a euchre deck and some faro chips. Now look up there. Third one from the right, eh? Well, here it is. Is this yours?"

"Yes, sir."

"Glad of it. Can you describe the contents?"

"Yes, sir. The first thing on the top is a—a—"

"Yes, I know—a pair of stockings with holes in the heels. They belong to your sister, of course.'

"Sir!"

"No offence, madam. Many imposters come here, and we must be particular. Please go on."

"The next thing is a—a—"

"An old corset with a shoestring for a lace—perfectly correct. Please describe the next article."

"I won't do it!" she exclaimed.

"Pshaw, now! You mustn't take offense. There is a pair of shoes with half the buttons off, a bottle of face powder, a pair of gloves with the fingers out, and—"

"That isn't mine at all."

"Oh, it isn't, eh? Well, I'm sorry."

"I don't believe mine is here, and you needn't go to any further trouble."

"Very well. I shall go to dinner in half an hour. I place this satchel in this corner, and I shall tell the old man who relieves me at noon that a boy will come for it. That's all—good-bye—hope you will find your baggage."

When he returned at one o'clock the satchel was gone.

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PROCEEDING WITH CAUTION.

Though the story is old, though never before in print, the way Mr. Ben Reece tells this story is charming. When H. M. Wright was superintendent of the Lake Shore, he issued orders restricting the time of freight trains and ordering engineers and conductors to "always proceed with the greatest caution." Mr. Wright was in the habit of lying in ambush in unexpected places to catch his trainmen disobeying orders, and one night he was near by when Mat Roonin, having made up his train, was giving instructions to the engineer. "All ready, Jim," said Roonin; "whoop 'er up now, whoop 'er up." Just then the hand of Superintendent Wright was laid on the shoulder of the startled conductor. "What do you mean, sir, by 'whoop 'er up?'" was the official's imperious question. Roonin looked straight into his superior's face and answered: "Proceed with great caution, sir."—*Toledo Blade.*

LET ME OUT AT RUGBY.

The proverbial fussiness of travelling spinsters is here capped by a travelling (let us hope and trust) bachelor! The other day a middle-aged gentleman travelling on the line from Euston to Crewe put his head out of a first-class carriage window, and called to the guard, "Be sure you let me out at Rugby." "All right, sir," was the response. At the next stopping-place, however, the muffled-up head of the gentleman appeared through the carriage-window, with the inquiry, "Guard, is this Rugby?" "No, sir," was the reply: "but I will be sure to tell you when we get there." Not content with this assurance, at every stopping-place of a very slow train the head appeared at the window, and the poor guard's patience and temper were sorely taxed. At length the gentleman was overtaken by profound slumber, and the guard, to his horror, just as the train was moving out of the Rugby Station, recollected that he had forgotten to warn his troublesome passenger. In an instant he signalled to the engine-driver, and the train was backed alongside the platform. Out sprang the guard, rushed in breathless haste to the gentleman's compartment, seized his rug and traps, and with a "Now, Sir; be quick! the train is just moving," was in the act of bustling him out of the door, when in slow, sleepy tones, came the rejoinder, "Guard, what do you mean by this conduct? I sha—shall report you. I did not say that I wished to alight at Rugby. I only wished to ascertain our arrival at the station, as my doctor had informed me that by the time we had arrived there it would be the proper hour for taking my pill." Exit guard.

◆

SHE NODDED.

"My wife," remarked a prominent manufacturer, "never attends auctions. She went once, just before we were married, and, seeing a friend on the opposite side, nodded politely, whereupon the auctioneer knocked down a patent cradle, and asked her where she wanted it delivered."

HE WANTED SOMETHING AND HE GOT IT.

One of Uncle Sam's servants in Washington, who is not so famous for his personal cleanliness as he is for the amount of liquor he can drink, has a grievance against a well-known barkeeper for this reason. He went into the saloon, and hanging over the counter, he said thickly—

"Say, barkeeper, gimme something that'll do me good."

"Something wet?" inquired the barkeeper, with a cheerful smile.

"Of course; what do you take me for?"

The barkeeper sized him up for a moment, and reaching under the counter, came out with a basin of water.

"There," he said, "try that: I'll bring you some soap and towels in a minute."

But the public servant was insulted and left without even thanking the polite man in the white apron.

◆

CHOOSING A NEW DENOMINATION.

Old Lady (*to street gamin*): "Little boy, don't you want to join the Sunday-school, and grow up to be a good man?" Little Boy: "What Sunday-school is it?" Old Lady: "The Methodist." Little Boy: "No, I tried the Methodises las' year, an' didn't git nuthin but a stick o' broken candy an' a apple. I'm goin' to try the 'Piscopal this year."

◆

A NICE COMPLEXION.

Several gentlemen were standing at a corner when one of the most noted fashionable ladies passed on the pavement. "Ah!" exclaimed one of the gentlemen, "what a complexion! There is nothing to beat it. I am proud of that woman, I am." "Are you her husband?" asked a stranger. "No, sir." "Her father, then?" "No, sir, I am no relation of hers, but I am proud of her complexion. I am the druggist that sold it. I make it myself."

BRAVERY.

"Father, you are an awful brave man," said a Detroit youth, as he smoothed down the old man's gray locks the other evening. "How do you know that?" "Oh, I heard some men down at the store say that you killed thousands of soldiers during the war." "Me? Why I was a beef contractor for the army." "Yes, that's what they said!" explained young innocent, as he slid from the kitchen.

◆

HIS WATCH WAS REGULAR.

"Mistah Johnsing. I t'ink you's sufferin' wid a affexion ob de heart. Yo' heartbeats is terrible irregular." "Dat's all right, doctah; but, sah, yo' has yo' ear right 'gin my watch, an' it hain't varied a minit in de las' free months, sah. Wid all respect to yo', I guess I go ter some older practitioner, sah."

◆

RAILROAD ITEM.

Awkward Idiot—"Your train is quite long, Miss Lucy."

Miss Lucy—"It will not be so long if you will take two feet off from it."

He had intended to conduct her to the supper table, but he had to get off the train very suddenly, so that some other young man conducted her to the banquet hall.

◆

A young lady while playing croquet one scorching afternoon, was sun-struck. It was a rich man's son. The marriage is believed to be a happy one.

Miss Tucker says it is with bachelors as with old wood; it is hard to get them started, but when they do take flame they burn prodigiously.

A lady was asked to join one of the divisions of the Daughters of Temperance. She replied, "This is unnecessary, as it is my intention to join one of the sons in the course of a few weeks."

Poetry.

A SONG FOR THE BOYS.

I'm afflicted with ills of the flesh, boys,
And I'll share my misfortune with you;
They are stripes from humanity's lash, boys,
Only shunned by the virtuous few.
Saints are scarce on the railroad of life, boys,
From the president down to the chap
Who is flagging for very poor pay, boys,
With his hair sticking out through his cap.

I've a rheumatic twinge in my toes, boys,
And a kink in the small of my back;
They are sure to disturb my repose, boys,
When in bed or when out on the track.
I have feasted on quail and on toast, boys,
From my grub-bucket daily for years;
Sure I don't know of men who can boast, boys,
Of such feeding, unless engineers.

Our conductors have napkins and rings, boys,
Silver knives, forks and spoons, and choice plate;
Sure we scoff at such fanciful things, boys,
As we dine on our engines in state.
With our fingers and thumbs we can throw, boys,
A square meal down our throats pretty quick.
It was thus Adam feasted, you know, boys,
Before Eve made a "mash" on old Nick.

Of high living I'd have you keep clear, boys,
It is loaded with numerous ills;
And besides, shun the schooner of beer, boys.
Yes, and worm-juice flowing through stills.
They are stumbling-blocks spread for your feet, boys,
Like the smiles of a widow through tears,
Every one of them full of deceit, boys,
And a trap to catch poor engineers.

I intended a moral to write, boys,
Till the widows ran into my head,
So I think I'll set brakes for to-night, boys.
And retire to my virtuous bed.
Ere the morrow's bright sun shall arise, boys,
I must up and have at it again,
For, no matter how stormy the skies, boys,
I'll be called to depart with my train.

◆

FOOTBOARD REFLECTIONS.

'Mid the sweltering rays of the mid-day sun
I'm here in the cab, while on flying wheels
I must make my long and my tedious run,
Ere the lengthened ray of the evening steals
Down o'er the track with its cooling shade,
To soothe the nerves that I oft must strain,
And I sigh as I think of the leafy glade
Where the rich are bound that are on the train.

Ah, yes, they are off to their cool retreats,
To their wealthy homes by the sounding sea,
Where their fare consists of the choicest meats,
With vintage rare as rich wines can be;
Where fortune deals from her lavish hand
The luckiest cards within her pack,
And woos them along with smiling bland,
Till the autumn breezes drive them back.

What wonder at all if I ponder o'er
The thousand ills of the luckless poor,
Who must toil 'mid the smoke and ceaseless roar
Of the daily load which our frames endure?
And our fare consists of a crust of bread,
To be moistened oft amid falling tears,
Ere we sink to rest on a thorny bed,
For a few short hours till the dawn appears.

God pity us all on the road of life,
We need His help to prolong the fight
We are forced to make in the daily strife,
As we humbly plod on our path of right;
And if by a step we pass its bounds,
What a cry is raised by the heartless throng,
Who unleash their pack of bloodthirsty hounds
To disjoint our bones for a simple wrong.

A flowery path o'er life's highway, sure,
The rich ones find who inherit wealth;
They may glide amid gilded crimes secure
In the sun's bright ray or in midnight stealth;
But the poor man toils like the veriest slave,
At his daily task, in all sorts of weather,
On his lowly road which ends at the grave,
To keep his body and soul together.

Sweet hope is unsubstantial food;
But for it where would we be to-day?
Discouraging thoughts that dare intrude,
Are by its influence driven away.
The crooks and thorns we daily meet
Along the route we are forced to tread,
May lead in a year to some cool retreat,
Where we'll lie at ease on a rosy bed.

LAUGHTER.

Laugh merrily while life is here,
For death cuts short all laughter;
Laugh all thy life, and let the tear
Come if it will hereafter.

More laughter in the world would bring
The "touch of nature" nearer,
Goodwill would flourish 'neath its wing,
And man to man be dearer.

No time like now; the future lies
A darkened road before us.
So let thy laughs outweigh thy sighs,
And merry be thy chorus.

We know that man is prone to tears,
And born an heir to sorrow,
But what's the use of doubts and fears
Of what may be the morrow?

The evil of to-day we read
Sufficient is for keeping,
So laugh away, let naught impede,
And give a truce to weeping.

FAITH IN ONE ANOTHER.

Cherish faith in one another,
When you meet in friendship's name;
In the true friend is a brother,
And his heart should throb the same.
Though your paths in life may differ,
Since the hour when first ye met;
Still have faith in one another,
You may need that friendship yet.
O have faith in one another,
When ye speak a brother's vow;
It may not be always summer—
Not be always bright as now.
And when the wintry clouds are heavy,
If some kindred heart you share,
And have faith in one another,
O ye never shall despair.
Then have faith in one another.
And let honor be your guide;
Let the truth alone be spoken,
Whatsoever may betide.
Though the false may reign a season—
Doubt ye not it sometimes will—
Yet have faith in one another,
And the truth shall triumph still.

ONE DAY'S FISHING.

One morning, when spring was in her teens—
A morn to a poet's wishing,
All tinted in delicate pinks and greens,
Miss Bessie and I went fishing—
I in my rough and easy clothes,
With my face at the sunshine's mercy;
She with her hat tipped down to her nose,
And her nose tipped—vice versa.
I with my rod, my reel, and my hooks,
And a hamper for luncheon recesses;
She with the bait of her comely looks,
And the seine of her golden tresses.
So we sat down on the sunny dike,
Where the white pond-lilies teeter,
And I went fishing like quaint old Ike,
And she like Simon Peter.
All the noon I lay in the light of her eyes,
And dreamily watched and waited;
But the fish were cunning, and would not rise,
And the baiter alone was baited.
And when the time for departure came,
The bag was as flat as a flounder,
And Bessie had nearly hooked her game—
A hundred-and-eighty-pounder.

Correspondence.

NOTICE TO CORRESPONDENTS.

We do not hold ourselves responsible for the opinions expressed by Correspondents.

We reserve to ourselves the right to publish or reject any correspondence

Rejected correspondence will not be returned unless accompanied by a stamped envelope.

All correspondence to be written on one side of the paper only.

We shall be glad to receive articles of interest and information on Railway Work, Machinery, &c. (English or Foreign), interesting Stories of Railway experiences, information of accidents, or any subject of general interest.

All correspondence to be addressed to Mr. T. G. Sunter, General Secretary, 17, Mill Hill Chambers, Leeds.

CONTINUOUS AUTOMATIC RAILWAY BRAKES.

To the Editor of Associated Societies' Journal.

Sir,

I entirely agree with the opinion expressed in your last issue, that at the present time the "battle of the brakes" has been reduced to two systems, namely: Westinghouse Automatic and Automatic Vacuum. I have always considered that a "continuous brake" is not simply an appliance to stop trains at stations and signals under ordinary circumstances, but that it is very much more, in other words, it ought to be a life-saving appliance, always ready at any moment to "go on," and save trains full of passengers in cases of accident or imminent danger. Having no interest of any kind in any brake, I have simply to look at the matter from an impartial standpoint, and consider which of the systems provides the greatest safety for the servants and the passengers, by stopping a train in the least distance.

The Westinghouse brake is as nearly instantaneous in its action over a train as possible; it is quicker than any other, and, as it takes effect first, it of course pulls up the train in the least distance. The value of a few seconds or yards may not fully be appreciated by your readers at first sight, but the saving of a second or two often means the difference between an accident avoided and a collision.

The Westinghouse brake, running at any given speed, would pull up a train clear of any obstruction, which, under similar circumstances, a train with any other brake would run into.

In July, 1880, I attended the important brake trials between Gisburn and Chatburn, on the Lancashire and Yorkshire Railway, and the following table of results, taken from Captain Galton's official report, shows very clearly the relative values of the various systems:—

Averages of all stops reduced to 50 miles an hour on a level, with the allowance made for the different percentages of the braked portion of the train to the unbraked portion, allowance being also made for the rotating momentum of the unbraked wheels in the train (except those of the engine).

Description of Brake.	Stops by Driver.		Stops from Van.		Slip Stops.		Remarks.
	Distance in feet.	Retardation in percentage.	Distance in feet.	Retardation in percentage.	Distance in feet.	Retardation in percentage	
Westinghouse ...	727	11·49	nt.tried	...	441	18·94	Gt. North. Train
Westinghouse ...	716	11·66	895	9·33	668	12·50	Lancashire and Yorkshire train. not including experiment No. 4.
Eames (duplex)...	752	11·10	914	9·14	754	11·08	
Sanders	891	9·37	1111	7·19	722	11·57	
Fay's hand brake	817	10·22	...	...	...	...	

The "Automatic Vacuum" brake, at the time of the trials, was known as "Sanders-Bolitho," and its performance is clearly shown. Since that date the name of Sanders-Bolitho has died out; but, nevertheless, the fact remains that the "Automatic Vacuum" brake to-day is worked by the same power and governed by the same laws as it was in 1880.

At every official brake trial conducted in this country, the Westinghouse Automatic has proved itself the most efficient life-saving appliance, but if any doubt exists, it would be of advantage if another series of brake experiments could be carried out to prove the exact number of yards which the Westinghouse brake saves in making a "stop," as compared with the Automatic Vacuum or other brakes.

Yours faithfully,
CLEMENT E. STRETTON.

40, Saxe Coburg Street,
Leicester, 28th Feb., 1888.

THE RECENT COLLISION UPON THE METROPOLITAN RAILWAY.

To the Editor of the Enginemen's and Firemen's Journal.

SIR,—On the 2nd of January, it will be remembered, a collision took place at the Midland Junction, King's Cross (Metropolitan), which has been considered one of the "closest shaves" on record. At this junction, which is in a tunnel, the down line from the City to the Great Northern Railway is crossed by the up line from Kentish Town and the Midland Railway to the City. A Great Northern goods train had passed safely over the diamond crossing, with the exception ot the last corner of the rear brake-van, when it was run into by a Midland passenger train running in the opposite direction, which had by mistake over-run the junction signals. One plate of the engine coal-bunker broken, and the corner of the van broken, was the only damage to be recorded. The lessons to be learned from this trivial accident are, however, of the greatest importance; for, as the Government inspector points out in his report, had the Great Northern train been a few seconds later it would probably have cut through the Midland passenger train with very terrible consequences. The cause of the accident was, that the tunnel being full of steam and smoke, the driver was unable to see the *distant* signal, and therefore mistook the *home* signal for it; but the actual fault is that this busy and important junction is not worked strictly on the system of junction block working.

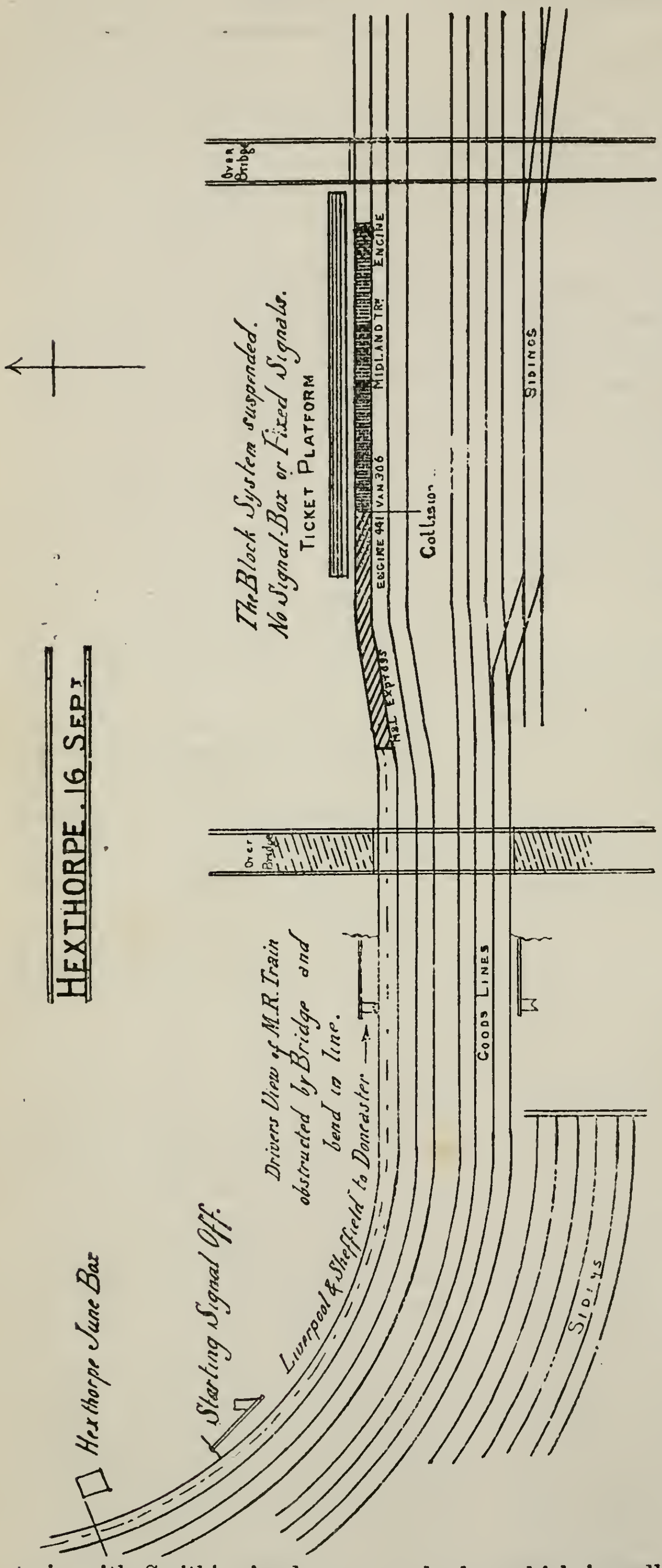
Two trains, which have to cross each other's paths at a junction, should never be allowed to approach at one and the same time—one train ought to be detained at the signal box in the rear—yet, according to the evidence of the sigealman, the "Instructions" *permit* two trains to approach at once, and they actually do "several times an hour throughout the day." It is to be hoped that this "close shave" will induce the companies to alter the instructions, and strictly carry out junction block working.—I am, Sir,

Yours faithfully,
CLEMENT E. STRETTON, C.E.,
Engineer, Associated Society of Enginemen and Firemen.

DEAR SIR,—I was pleased to notice in the first number of our journal, the evident satisfaction the acquittal of Brothers Taylor and Davies, charged with manslaughter, had given enginemen and firemen generally, and I beg to be allowed to give my testimony to the sterling character of Brother Taylor, whom I have known for a period of fourteen years, and who was apparently never was so happy as when lending a helping hand to an unfortunate comrade, and his practical sympathy to others, even whilst awaiting his trial, is still fresh in my recollection. He was also one of the pioneers of our Society.

I am, yours truly,
MIDLAND ENGINEMAN.

THE HEXTHORPE ACCIDENT.



The Hexthorpe disaster, and the very important part the Associated Society of Engineers and Firemen took on behalf of its two members, Brothers Taylor and Davies, will long be remembered by our readers, and we have no doubt the annexed plan (which we reproduce, upon a small scale, from the large diagram made by Mr. C. E. Stretton, upon the day of the accident), will be of interest to our members.

The facts of the case were very simple indeed. In consequence of the extra traffic to Doncaster Races, the Manchester, Sheffield, and Lincolnshire Co. adopted the most dangerous practice that could be imagined, namely, they "suspended the use of the block system," instead of, as they should have done, introducing extra block signal-boxes, and keeping that valuable system in use. To suspend the block system is such a dangerous experiment, that it ought to be made a crime.

The driver of the M. S. and L. express approaching from the left hand of diagram passed the *starting signal*, which was off, and ran round the curve, the bridge over the line and the curve obstructed the driver's view until he was within 359 yards of the other train. That distance was more than ample to have stopped a train provided with a proper automatic continuous brake, but unfortunately the company had only provided the train with Smith's simple vacuum brake, which is well known to be inefficient and constantly fails to act when required. On this occasion it clearly did fail to act, and the terrible loss of life followed.

LEEDS, *March*, 1888.

DEAR SIR,—I shall be glad if you will give me some information respecting the formation of ambulance classes for enginemen and firemen, and oblige,

Yours, ENQUIRER.

QUERIES.

Will water boil and be converted into steam at a lower temperature than 212 degrees?

What is the meaning of the term horse power, and with whom did it originate?

What is the difference in the working of two engines, one with lap to the slides, and the other without?

Does the heat of the human body bear any resemblance to, or arise from the same cause as, the heat of a common fire?

What am I to understand by there being three kinds of bleeding in connection with the human body?

Will any of your readers oblige me by answering the above questions.—Yours,

CURIOUS.

Society News.

SWANSEA, *March*, 1888.

SIR,—I am pleased to inform you that at our last monthly meeting, held at the Landove Coffee Tavern on Saturday, February 25th, was very well attended, and that six new members were duly enrolled. I remain, yours faithfully,

SECRETARY.

KING'S CROSS, LONDON,
March, 1888.

SIR,—At our last general meeting, held on Sunday, March 4th we had four persons admitted into our branch, and I have every reason to believe that I shall be able to record the names of other new members after our next meeting.

I remain, yours fraternally,
SEC., King's Cross Branch.

SIR,—I am happy to inform you that we are doing some business at this station, and trust that we may go on increasing our numerical strength, also that we may soon reap some of the fruits of the labours of our organising secretary, Mr. Ball, who, I am given to understand, displayed great energy in canvassing non-members during his recent visit to London, and I learn with great satisfaction that additional members are now joining the various London Branches.

It is desirable that this kind of work should be continued, and every encouragement given to our organising secretary to address meetings at all locomotive stations where we have not yet got a branch of our Society. These meetings could be managed by the members of the branches throughout the country, as I feel convinced that much good will accrue from such like meetings, is, in my opinion, there are hundreds of enginemen and firemen who would join our ranks, if they had the objects of our Society pointed out to them, as the benefits this Society offers to enginemen and firemen are more valuable than can be found in any other trade society, which ought to commend itself to enginemen and firemen.

I am, yours fraternally,
F. GREEN,
Sec., King's Cross Branch.

STRATFORD, LONDON,
March, 1888.

DEAR SIR,—Our last meeting was one of an encouraging nature, and I am happy to inform you that we made seven new members on that occasion, and have hopes of more in the immediate future.

I am, yours fraternally,
SEC., Stratford Branch.

OPENSHAW, *March*, 1888.

DEAR SIR,—I am pleased to state that we are making good progress at this branch, new members being made every meeting night.

Yours fraternally,
J. HARRISON,
Branch Secretary.

Battersea, London,

February 18*th*, 1888.

Dear Sir,—On February 12th, 1888, a meeting was held at The Two Brothers, Battersea, under the auspices of the A.S.L.E. & F. The room was comfortably filled, and a L.B. & S.C. driver was voted to the chair, and, after a few well chosen remarks, called upon the organising secretary, Mr. Ball, to explain the objects and benefits of the Society, under whose auspices the meeting had been called. Mr. Ball then said he was very pleased to see such a meeting as the one before him, and by the time he had done he hoped to be able to show what benefits could be derived by the combination of such a body as the enginemen and firemen of the United Kingdom. He also gave in detail the trial of Taylor and Davis, and as he told us of the great pains and trouble taken by the general secretary (Mr. Sunter), to see justice done to those members, it brought forth shouts of applause, and his zeal was highly appreciated by all present. After Mr. Ball had done, five came forward and had their names enrolled, and several others promised to join at their earliest convenience. Several questions were asked and satisfactorily answered by the organising secretary, and with a vote of thanks to him, the chairman, and the representatives of the various London branches present, one of the most encouraging meetings of enginemen and firemen was brought to a close.

I remain, yours truly, J. B.

◆

HONORARY MEMBERS ADMITTED IN 1888.

Messrs. Tippett & Sons, Solicitors,
Maiden Lane, London.

Mr. A. Maxwell,
St. Pancras Road, London.

Mr. F. Beaumont,
Adelphi Hotel, Railway St., York.

LIST OF BRANCHES.

We have now branches at the following places:—

Neath
Plymouth
Exeter
Oxford
Leeds
Cardiff
Battersea
Bow
Lincoln
Wolverh'ton
Skipton
Retford
Birkenhead
Carnforth
York
Llanelly
Mexborough
Newport
Kentish Town
Paddington
Newport
Sheffield
Toton
Sandhills
Manchester
Swansea
Liverpool
Bristol
Grimsby
Gloucester
Birmingham
King's Cross
Stratford
Peterboro'
Bradford
Openshaw
Nottingham
Stockport
Reading

Obituary.

The Secretary of Exeter branch thus writes:—Our members will hear with deep regret of the death of the treasurer of Bristol branch—Robert Brew, who succumbed to an attack of bronchitis on the 6th inst. We shall all miss a well-known face, as he was of a kindly, sympathetic nature, a quiet disposition, and firm in purpose, being imbued with the true spirit of unity—that unity which seeks by honest combination to obtain justice and fairness for his fellow-workmen, so as to strengthen his weak brother's hands. He was a G. W. engineman, aged 34 years, and leaves a sorrowing wife and family.

We leave him in the hands of the common Father of all,

"Whose smile is mercy, and whose word
is truth,"

with mournful hearts, lit up with pleasant memories.

◆

We regret having to record the death of one of our number—Brother John Pearson Hull, of the Liverpool branch, who departed this life on February 29th, 1888, aged 32 years, feeling assured that in his death the Society has lost a worthy and faithful member, who was respected by all who knew him.

LOCOMOTIVE ENGINEERS AND FIREMEN'S
Monthly Journal.

"This that they call Organization of Labour is the universal vital problem of the world. It is the problem of the whole future for all who will in future pretend to govern men."—THOMAS CARLYLE.

"I know no better definition of the rights of man:—Thou shalt not steal; Thou shalt not be stolen from; what a society were that—PLATO'S REPUBLIC, MORE'S UTOPIA, *mere emblems of it! Give every man what is his—the accurate price of what he has done and been—no more shall any complain, neither shall the earth suffer any more."*—THOMAS CARLYLE.

VOL. 1. APRIL, 1888. NO. 3.

ENGINE DRIVING.

"IN fire-horses and wind-horses we career," says Carlyle, describing what De Quincey called the "glory of motion." We admire the mighty forces, fire-fed like Enceladus, but we forget the fine fellows who control them in sun-time and in snow-time. The man who guides, and the man who feeds with fuel of flame, the monster of Titanic birth, the Frankenstein monster, with muscles of steel and heart of fire, we regard as if they were mere abstractions, instead of men with emotions, and homes, and wives and children of their hopes and poverty. There are no more dauntless heroes in the world of work than engine-drivers and stokers. To drive an express through the black and bleak winter night, with unknown lurking calamity in the mysterious darkness in front, and with two or three hundred lives unconscious of danger behind, not once only, but night after night, as a daily routine of labour, is an exploit far worthier of reward and decoration than is commonly allotted to it. The sallow, earnest-faced man on the engine, with keen, scrutinising eyes, wears no scarlet coat. His attire is greasy and grimy, and his appearance is unprepossessing. The only music with which he goes into action is the shriek of his engine; the shots he hears are the explosive reports of the fog-signals sending up a shower of sparks under the grinding wheels, as the train burns its way through the pitchy gloom, and

Shears the moonlight with its shadowy shrouds,
Till every breath and pant
Mirrors and paints itself against the clouds,
Like northern lights aslant.

Illuminations the driver has, too, but they come to him a blaze of bewildering signals, green, white, red, each point of light hung up like stars in the sky, or lying amid points and crossings on the track, and revealing the cold network of steel, full of vital import. Bonfires he has, but they are kindled in the fire-box, and send out a strong white circle of intense light, in the darkness of a dark tunnel—a medallion in which the driver and his "mate" stand in Rembrandt relief from the shuddering background. These humble heroes of the engine footplate, obscure and unostentatious, are far greater men of distinction than we wot of. Their tragedies are silent; their triumphs occur day and night all the year long. Their campaign never ceases. What soldier's nerve is equal to the straining task of the driver looking out for the sudden signal, or the first symptoms of danger ahead, the face exposed to wind and wet flitting past in a million needle points, with the speed of a whirlwind, the lower part of the body burning from the heat of the molten furnace, while a flash of white and red determines the fate of a train and the destinies of the people behind that silent, sober, and dauntless driver. They ride in cosy little cushioned rooms, with glass windows, rain-dotted with the tempest, and a cheerful gleam of light to grace the gloom. The man who has control of their fortunes is to them part of the steam which impels them from departing-place to destination. They do not regard him as a brave-hearted human being. The porter who rolled their luggage along the platform, with a clumsy "By-yer-leaf," received his expected douceur; the guard behind, with his smart uniform and civil manners, received his "tip" in silver, and his attention deserved, perhaps, the compliment which the Prince of Wales at a recent banquet paid this obliging official. But the engine-driver is too oily and cokey, too rancid and rough, too much like the Toodles of Dickens' story, to attract the traveller whose life is in his keeping.

Scientific.

A STEAM LOGGER OR SNOW LOCOMOTIVE.

The *North-Western Lumberman* says: There may be seen at the camp of Shields and Wilson, jobbers for the Sawyer-Goodman Company, located in Northern Michigan, on a little lake that is the source of the Escanaba River, a steam logger or snow locomotive, the most unique machine ever invented for logging purposes, and one that appears destined to work a revolution in certain directions. Two and a half or three years ago, Geo. T. Glover, an old Saginaw Valley logger, originated the idea of this machine, and now after much experiment, the outcome is a machine weighing 12 tons, that can be driven by steam on a snow road, and draw, it is asserted by some, as many as 30,000 or 40,000 ft. of logs.

The mechanism of the logger is simple, and in some respects very ingenious. Nearly over the centre of the hind sled sits the 10 by 12 double upright engine, which is of 120 horse-power, geared 10 to 1, thus increasing it to 1,200. Midway between the two sleds the boiler is located. This is of steel, 5½ ft. in diameter, 7½ ft. high, with 320 two-inch submerged flues, and gauged to a pressure of 150 lbs. The steam pipes have swivel joints. There is a steam syphon for filling the water tank, and an apparatus for heating the water before it enters the boiler. Either wood or coal may be used as fuel. There are four wheels on the driving axle 4 ft. in diameter, weighing 3 tons. Each wheel is a foot wide, and on its face there are 17 teeth 9 in apart. The angle of these teeth is 3 in., they are held in place by bolts and nuts; therefore, if less traction power is required, teeth of a shorter angle can be affixed. The axle of the drivers is of steel, 6 in. in diameter, 7 ft. long, and weighs half a ton. If desired, two of the wheels may be removed, and the remaining two placed on the axle in any position required. The steering gear is simply a wheel in front, which places the tongue of the forward sled in any desired position by means of a link belt chain running over the wheel, over pulleys attached to either side of the frame, and made fast to the sled tongue; the drive chain, between the engine and the drivers, is made of 1¼ in. Ulster iron, and weighs 18 lbs. to the foot.

The logger is 28 ft. long, and of course a rigid machine of that size could not be driven over other than a level road. To overcome this difficulty, the drivers and engine are supported by separate frames, the pivot point of their connection being about the middle of the front sled. By unfastening the drive chain and removing the connecting bolts the two frames are disconnected, and the horse (the engine), as it were, may be taken from between what one might imagine to be the thills—the long timbers extending forward from the drivers. The bolts fastening the two frames together slide in slots; in the ends of the thills there are embodied powerful springs, and to compress these springs to a proper tension are jack screws, which are made fast to the engine frame. It will thus be seen that the springs act as a cushion, and that the logger will adapt itself to the unevenness of a road. To further assist in this purpose there is a steam piston over and immediately in front of the wheels. This piston box is fastened to the frame of the wheels, and when necessary, by use of the piston, the rear sled, bearing the weight of the engine and part of the boiler, can be lifted clean from the ground, thereby doing away with all but two points of contact, the front sled and the drivers, and at the same time throwing additional weight upon the latter.

The great difficulty—that of obtaining sufficient traction and road-making power of the driving wheels is overcome by turning the exhaust steam on the driving wheels. The wheels are decked, and around the edges, under the frame, are heavy rubber curtains which nearly reach to the road surface. The wheels literally work in a steam box, are heated by steam, and when they pass over snow it is damped and compressed, and in cold weather immediately converted into solid ice. By chopping in the road over which the logger has probably run 100 times, the fact was disclosed that the ice was from six to nine inches thick. The chain running from the loads may be hitched to the frame directly in the rear, and on a line with the axle of the drivers, or, if a very heavy load is to be hauled, a foot and a half higher. In the latter case it will be readily understood that the frame extending three feet back of the axle of the drive wheels acts as a lever, and that the harder the logger pulls, the greater the weight on the wheels, and consequently greater the traction.

The road on which the logger runs is 80 rods long, comprising a sharp curve and a grade up which teams would have to be doubled if hauling a load. On a recent occasion there were at one end of the road two sleds loaded with 28 logs that would probably scale from 6,000 to 7,000 ft. The sled runners were frozen in the snow. The logger was backed up, and the chains connected close to the front sled. Steam was let on and the first movement was that the front of the load was lifted clean from the ground, and the logger walked away with no more effort than though it were drawing a hand sled instead of two fair-sized loads of logs. The speed of the logger is about five miles an hour. A certain amount of snow seems to impede it but slightly, if any. An old road that lead to a skidway leaves the main road and strikes into it again after going 12 or 15 rods. On this road there was about a foot of newly fallen snow. The bottom of the road was not even. As a test it was decided to run the logger around this curve. The *Lumberman* representative saw a stick protruding through the snow, and suggested that it be removed. "If you think we require a dude road to run I will show you to the contrary," said Mr. Glover, and suiting the action to the word he picked up some big sticks from a pile of 4-foot wood and tossed them into the snow. The logger was driven over the road and on to its old beaten path without a halt, leaving the prints of its teeth, 2-in. deep or more in the cord wood. It is plain that the locomotive can wade through at least a foot of snow without being materially bothered.

Before seeing the logger move one would not imagine that it could be handled advantageously. In this respect it is a big surprise. It is completely under the control of its operators. It can be turned within three minutes, with probably time to spare, and on space not greatly exceed- 25 by 50 feet. A driver of a six-horse team, on a given area, would have to hustle if he succeeded in getting his horses head-to in less time than the logger can be turned. It runs backwards as readily as forward. Three men are necessary in operating it—an engineer, a fireman, and a steersman.

NEEDLE-MAKING.

Almost all the needles made in England are made at Redditch. The wire is of the best quality of steel, and is supplied in coils varying from 1,200 to 3,000 yards in length, and from one twenty-second of an inch to one one-hundredth of an inch in thickness. The processes passed through are as follows: The wire is cut in lengths of two needles by hand or machine shears; these lengths are annealed in bunches of about four inches in diameter; while still hot and held together by rings, the bundles are rolled over by hand pressure on an iron table, so as to straighten each other, they are then pointed at both ends successively upon quick running grindstones, being rotated between two india rubber bands, travelling over a grindstone with concave face; by a blow from a falling die the two heads are headed, and gutters marked for the eyes; the eyes are pierced by a pair of punches in a delicate hand-press; the needles are threaded on a pair of fine wires, and filed to remove the burr made in stamping; they are then broken across through the thin fin left between the heads, and the heads themselves rounded by filing; they are then heated in small iron trays, and dropped separately into an oil bath, to harden them; after which they are tempered on a hot plate or in a stove, and straightened by a hand hammer on a small anvil, to remove any warping due to hardening.

The needle has now assumed its final condition, but it is not yet finished. The next operation is scouring, for which a number of needles, mixed up with soft soap, emery and oil are wrapped up with canvas into a roll about two feet long and three inches in diameter, and then run backward and forward under runners worked by a crank from the engine. The process goes on for eight hours, during which the needles are continually rubbing against each other, and it is repeated from two to eight times, the final scouring being done with putty powder. In some cases the straightening and scouring are performed by machinery. When perfectly scoured, the needles are shaken up in a tray until they lie parallel, and then by a dexterous motion of the hand they are shifted so that all the points are in the same direction. Next, defective needles are picked out of the lot by hand; the eyes are "blued" or softened by traversing them over a gas flame, and in some cases the eye is smoothed on each face by a fine countersunk drill. The needles are then strung on horizontal wire, carried on a reciprocating frame. The wires have serrated surfaces which smooth the inside of the eyes as the needles swing to and fro; this process is called burnishing. Lastly, the heads and points are finished off by grinding, first on a nine-inch grindstone, and then on an emery roller, the workman holding a number of needles in his hand together and rolling them between his finger and thumb. It now only remains to stick the needles side by side in sheets of paper and pack them for sale.

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CAUSE OF EARTHQUAKES.

Major Powell, Director of the United States Geological Survey, says the explanation of earthquakes usually accepted by geologists is something like this:

The earth's surface is believed to be formed of a solid crust of rock of variable thicknesses in different regions. This crust rests upon a material in a more or less fluid condition, so that it readily yields to agencies of deformation like water or molten iron. The reasons for believing that the interior is in a somewhat fluid condition are various. The most important are:

1. From very many observations made in mines, artesian wells, etc., it is discovered that there is an increase of temperature from the surface downward, and that this increase is so great that a degree of heat sufficient to melt all known rock is reached.

2. By certain geologic genesis certain rocks from below are brought to the surface in mountain building, and these rocks

show evidence of having been greatly heated, and even of having been melted.

3. Molten matter in very large quantities comes up from the interior of the earth through crevices and volcanic vents. Besides these lines of evidence there are many accessory facts which tell the same story. The interior of the earth is constantly oozing heat in a variety of ways. A small amount is probably conducted to the surface and radiated into space. A large amount of heat is conveyed from the interior through the agency of hot springs.

Such springs are found in many portions of the known earth, and in a few districts are very abundant. Through them much heat is conveyed from the interior to the surface, which is there radiated into space. The lavas that are brought up yield vast stores of heat, all of which is lost to the earth through radiation. The secular cooling which results from the above causes must necessarily diminish the magnitude of the earth, and as it shrinks the solid exterior crust must in some manner yield so as to conform to the lesser magnitude thus produced.

The stress produced upon the crust of the earth by the shrinking of the interior is modified by another class of agencies. The land surface of the earth is washed by rains and rivers, and in the aggregate large bodies of material are carried away and deposited in the bottoms, which are gradually filled up, and especially deposited along the shores of the sea. The unloading of land areas and the overloading of certain water areas, to a large extent localizes it. Again, the fluid or plastic material of the interior changes its position beneath the crust of the earth and portions of it flow out as lava, thus an additional set of stresses is established. Thus stresses are established through the agency of a contracting interior, through loading and unloading at the surface, and through the flow of interior matter to the lava beds, where such matter is poured out upon the surface. The stresses produced by the various agencies thus described gradually become so great that at last the crust of the earth must yield, and earthquakes are produced.

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A WONDERFUL METAL.

Aluminum is a most wonderful metal. It was introduced by a German chemist named Wohler, in 1827, and exists in combinations such as clay, beauxite, corundum and cryolite in vast quantities. Its colour is silver-white, and it possesses remarkable strength, stiffness, malleability, flexibility, ductility, and exceeds iron in tenacity. It is not affected by moisture, melts at a lower temperature than silver, and a pound of it occupies three times the space of a pound of silver. It is light, very sonorous, and easily cast in sand or metal moulds. It resists the action of fruit or vegetable acids, cold nitric or sulphurous acids, and is not tarnished by sulphur or coal gas. It conducts electricity nearly as well as silver, has no odour or taste, and is not poisonous. It can be forged, rolled, and beaten into leaf metal as easily as gold or silver, wears better than silver, and can therefore be used with advantage in the manufacture of all kinds of instruments, watches, and jewellery of every description, cutlery of all sorts, and, in fact, for almost everything. It also combines well with most other metals, giving alloys of unusual quality and value. It may be considered, all in all, as one of the most valuable of metals.

⁂

EXERCISE IN THE TREATMENT OF HEART DISEASE.

For generations the main idea in the treatment of organic heart disease has been physical rest to diminish the labour of the damaged organ. We have been in the habit of prohibiting all forms of active labour to the sufferer from cardiac disease, and the principle of our treatment has been the unexpressed but ever-present idea, accepted as a self evident axiom, that perfect rest was the best means of securing muscular compensation. Professor Oertel's experiments and results have come with startling surprise upon those who forgot to distinguish between a useful principle and the exceptions which the multiformity of disease renders it imperative to recognize. As is well known, he treats a considerable proportion of cases of organic heart disease by regulated exercise, especially graduated ascents of mountains, and his results place the value of his method beyond reasonable dispute. There is nothing really surprising either in his treatment or the success which has attended it. A little reflection will suffice to convince us that, while rest is often useful, and indeed quite indispensable, in heart disease, there are yet many cases in which well regulated exercise will improve the nutrition of the cardiac muscle, as of the rest of the muscular system, and hence tend to the promotion of circulatory vigour. —*Medical Record.*

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OLD IN HALF-AN-HOUR.

The ephemerids, tiny-winged insects which were said to be born in the morning, to be in the prime of life at noon, and to be in extreme old age at sunset, are put completely in the shade by the group of animalculi which Dr. Dallinger has been investigating, and which he has named *saccophytic.* So inconceivably small are these creatures, that six millions of them could be placed on the severed end of a hair of medium thickness. The function of the group is to play the part of scavengers. They breed in dead organic matter, breaking up the tissue in order to set free the gases and other elements of which it is composed. No fiction can be stranger and more wonderful than the true story of the life of these invisible creatures. When born, by the process of fissure from the parent body, they are tiny specks of egg-shaped protoplasm. Minute by minute they grow larger. Then the bodies are quartered, as it were, by the appearance of a lengthwise and a crosswise fissure. Further fissures are speedily carried diagonally through the divisions of the cross. Then a third series of fissures is carried through the diagonals. The next process is a kind of twist, which gives the fissures a graceful curve. Last of all, the body of the creature breaks up entirely, and each section between the fissures becomes a complete creature itself, and commences the same round of existence. The whole of these changes, from the separation of a new creature from the parent body till itself breaks up in the same manner, takes place within half-an-hour.

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EXERCISE.

The errors that prevail with regard to early morning exercises are simply monstrous. Even the strong and athletic are liable to injure themselves by exercising long and vigorously in the early morning on an empty stomach, while the delicate, and dyspeptic, and the nervous should not allow themselves to indulge in any sustained activity of brain or muscles until the system has been fortified by at least a preliminary breakfast. Farmers sometimes injure themselves by working too hard and too long before breakfast. Moderate exercise, such as walking, lighter forms of gymnastics, and easy games, can be taken indiscriminately, just before or after meals, without injury; but the severer tasks—rowing, active games—should usually be reserved for the middle of the forenoon or afternoon, or for the evening. It is not well for us to go to our meals in a condition of exhaustion, either of the brain or of the muscles. It is not well to be over-fastidious about exercising just after meals, for our own feelings will usually guide us right. After a hearty meal we do not care to plunge into the severest work.—*Dr. George M. Beard.*

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BRICK AND STONE BRIDGES OF LARGE SPAN.

According to Prof. E. Dietrich, of Berlin, there are only 57 bridges of brick or stone existing having a span greater than 131 ft.

Forty of these have spans lying between 131 ft. and 164 ft., 10 have spans of from 164 ft. and 200 ft., three of from 200 ft. to 230 ft., and one only, the Cabin John Bridge, near Washington, exceeds this limit, and has a span of 237 ft. Thirty of these are road and 22 are railway bridges ; one carries a canal, another a conduit, and three are not classified. Fourteen of them date from before the commencement of the present century, 22 were built between the years 1800 and 1860, five between 1870 and 1880, six between 1870 and 1880, and since then 10 have been erected. In 22 of the bridges the rise lies between half and and one-third of the span, in 18 between one-third and one-fourth the span, in 10 between one-fourth and one-fifth the span, and in six between one-fifth and one-eighth the span. One bridge only, a road bridge in Turin, has a flatter arch than given by the smallest of the above ratios, and in this case the rise is $\frac{1}{8\,18}$ the span. The radius at the crown lies in 15 cases between 66 ft. and 98 ft., in eight between 98 ft. and 131 ft., in 11 between 131 ft. and 164 ft., and in three cases between 154 ft. and 187 ft. 8½ in., the latter being the radius at the crown of the Devil's Bridge, at Bevizzo, Italy. The ratio of the arch at the crown to its radius at the same point is in 30 bridges between one-tenth and one-twentieth, in 10 between one-twentieth and one-thirtieth, and in eight between one-thirtieth and one-thirty-fifth. In all the railway bridges this ratio lies between one-twentieth and one-thirtieth, the smaller fraction being solely confined to road bridges. Twenty-seven of the bridges are situated in France, 13 in Italy, 10 in England, two in Austria, two in Spain, and one each in Germany, Switerland, and the United States.

WHAT A VOLCANO CAN DO.

Cotopaxi, in 1738, threw its fiery rockets 3,000 feet above its crater ; while, in 1754, the blazing mass, struggling for an outlet, roared so that its awful voice was heard at a distance of more than 600 miles. In 1797, the crater of Tunguragua, one of the great peaks of the Andes, flung out torrents of mud, which dammed up rivers, opened new lakes, and in valleys of 1,000 feet wide made deposits of 600 feet deep. The stream from Vesuvius, which in 1837 passed through Torre del Greco, contained 33,600,000 cubic feet of solid matter ; and, in 1793, when Torre del Greco was destroyed a second time, the mass of lava amounted to 45,000,000 cubic feet. In 1769, Etna poured forth a flood which covered 84 square miles of surface, and measured nearly 100,000,000 cubic feet. On this occasion the sand and scoria formed the Monte Rosini, near Nicholosa, a cone two miles in circumference, and 4,000 feet high. The stream thrown out by Etna, in 1810, was in motion at the rate of a yard a day, for nine months after the eruption ; and it is on record that the lava of the same mountain, after a terrible eruption, was not thoroughly cool and consolidated ten years after the event. In the eruption of Vesuvius, A.D. 79, the scoria and ashes vomited forth far exceeded the whole bulk of the mountain ; while in 1660, Etna disgorged more than twenty times its own mass. Vesuvius has sent its ashes as far as Constantinople, Syria, and Egypt ; it hurled stones, eight pounds in weight, to Pompeii, a distance of six miles, while similar masses were tossed up 2,000 feet above its summit. Cotopaxi has projected a block of 109 cubic yards in volume, a distance of nine miles ; and Sumbawa, in 1815, during the most terrible eruption on record, sent its ashes as far as Java, a distance of 300 miles of surface !

THE EYESIGHT.

The sight in most persons begins to fail from forty to fifty years of age, as is evidenced by an instinctive preference for large print ; a seat near the window for reading is selected, there is an effort to place the paper at a convenient distance from the eye, or to turn it so as to get a particular reflection of the light ; next the finger begins to be placed under the line read, and there is a winking of the eye as if to clear it, or a looking away at some distant object to rest it; or the fingers are pressed over the closed lids in the direction of the nose to remove the tears caused by straining.

Favour the failing sight as much as possible. Looking into a bright fire, especially a coal fire, is very injurious to the eyes. Looking at molten iron will soon destroy the sight; reading in the twilight is injurious to the eyes, as they are obliged to make great exertion. Reading or sewing with a side light injures the eyes, as both eyes should be exposed to an equal degree of light. The reason is, the sympathy between the eyes is so great that if the pupil of one is dilated by being kept partially in the shade, the one that is most exposed cannot contract itself sufficiently for protection, and will ultimately be injured. Those who wish to preserve their eyesight should observe the following rules, and preserve the general health by correct habits:—

1st. By sitting in such a position as will allow the light to fall obliquely over the shoulder upon the page or sewing.

2nd. By not using the eyes for such purposes by any artificial light.

3rd. By avoiding the special use of the eyes in the morning before breakfast.

4th. By resting them for half a minute or so while reading or sewing, or looking at small objects; and by looking at things at a distance, or up to the sky; relief is immediately felt by so doing.

5th. Never pick any collected matter from the eyelashes or corners of the eyes with the finger nails; rather moisten it with the saliva and rub it away with the ball of the finger.

6th. Frequently pass the ball of the finger over the closed eyelids towards the nose; this carries off an excess of water into the nose itself by means of the little canal which leads into the nostril from each inner corner of the eye, this canal having a tendency to close up in consequence of the slight inflammation which attends weakness of eyes.

7th. Keep the feet always dry and warm, so as to draw any excess of blood from the other end of the body.

8th. Use eye-glasses at first, carried in the vest pocket attached to a guard, for they are instantly adjusted to the eye with little trouble, whereas, if common spectacles are used, such a process is required to get them ready that, to save trouble, the eyes are often strained to answer a purpose.

9th. Wash the eyes abundantly every morning. If cold water is used, let it be flapped against the closed eyes with the fingers, not striking hard against the balls of the eyes.

10th. The moment the eyes feel tired, the very moment you are conscious of an effort to read or sew, lay aside the book or needle, and take a walk for an hour, or employ yourself in some active exercise not requiring the close use of the eyes.

THE MEDICAL POSSIBILITIES OF PHOTOGRAPHY.

The *Evening Post* says: "In the *Camera* magazine a very curious phenomenon, in connection with photography, is recorded by the person who observed it. He took a portrait of a child apparently in full health and with a clear skin. The negative picture showed the face to be thickly covered with an eruption. Three days afterward the child was covered with spots due to prickly-heat. The camera had seen and photographed the eruption three days before it was visible to the eye. Another case of a somewhat similar kind is also recorded, where a child showed spots on his portrait which were invisible on his face a fortnight previous to an attack of small-pox. It is suggested that these cases might point to a new method of medical diagnosis."

Miscellaneous.

AMBULANCE WORK FOR ENGINEMEN & FIREMEN.

It is very encouraging to know that my humble effort to awaken the interest of my fellow-members on a subject so eminently calculated to benefit enginemen and firemen generally as that of ambulance work has met with so much success, many enquiries having already been made, and several branches having expressed their willingness to go in for a course of instruction, and as no article has yet come to hand in answer to the question how to start ambulance classes, I will endeavour to make myself as clear as my limited stock of information will admit of. But seeing that our *Journal* has now a wider circulation than when first issued, it may not be thought out of place to again mention that the Association was established in 1877 for the purpose of spreading sufficient knowledge among all classes of society to enable them to give immediate help in cases of injury and sudden illness, pending the doctor's arrival, and that for want of that knowledge the lives of scores of railway men have been undoubtedly sacrificed. The need for such an Association cannot long be doubted, when it is taken into consideration that it has been proved by Parliamentary returns and official statistics that—

1. Between 2,000 and 3,000 lives are annually lost by drowning in England and Wales in *inland* waters *alone*. Many of these lives might be saved if only the proper treatment were observed on recovery of the bodies.

2. One thousand lives on an average are yearly lost on railways, while four or five times that number of persons are more or less injured.

3. During ten years the fatal accidents in London streets amounted to 2,195, and the injuries to 28,071. The average is proportionately the same in most towns.

4. In collieries and mines the annual loss of life is at least 1,000, and it is stated that for every person killed six are injured.

Workmen employed in dangerous occupations are naturally more exposed to accidents, but they possess no monopoly of danger. The country gentleman may as easily break a leg or a collar bone in the hunting field, as the ordinary foot passenger treading on a cabbage leaf or a piece of orange peel on the pavement may slip and dislocate an ankle. Even a simple act, such as breaking the glass when drawing the cork from a wine bottle, may cut an artery, and inflict such an injury that life will be lost unless immediate steps be taken to arrest the bleeding. A child can do this if properly taught. Rich and poor alike suffer from ignorance of "first aid." But recently a wealthy lady in a provincial town slipped when alighting from her carriage and broke her leg. Had a surgeon, or an ambulance pupil, been on the spot the limb would have been properly handled, splints (extemporised or otherwise) applied, the lady placed in a recumbent position on a stretcher, which would have been extemporised had a proper one not been available, and the patient would in all probability have been well in a few weeks. The well-intentioned, but ignorant bystanders replaced the lady in her carriage, doubled up the broken-leg, a "simple" fracture became "complicated," and fatal results ensued. Many similar instances might be quoted. The St. John Ambulance Association is striving, already with great success, to remove this lamentable ignorance.

Some idea of the interest taken in this work may be gathered when it is considered that since the institution of the movement in 1877, many hundreds of "Detached" classes and 250 "Centres" have been formed in all parts of the world, and upwards of 90,000 certificates of proficiency have been awarded. Instances of efficient "first aid" rendered by certificated pupils are of almost daily occurrence, and numerous cases, corroborated by the highest medical testimony, have been reported to St. John's Gate and are their registered certifying that life has been saved by pupils through the application of the knowledge acquired, and among the Presidents, Vice-Presidents, Life and Annual Members and Subscribers are Her Majesty the Queen and other members of the Royal Family, the Archbishop of Canterbury, and Clergy of all denominations; many leading Members of both Houses of Parliament; the Home Office; The Corporation of the City of London, and several of the City Companies. The movement has also had the cordial support of many of the most eminent members of the Medical Profession. T.R.H. the Princess of Wales, Princess Christian, the Duke of Connaught, the Duke and Duchess of Teck, and Prince Edward of Saxe-Weimar have presented certificates at public meetings. H.R.H. Princess Christian has attended the classes and obtained both certificates after passing the usual examinations, and the late lamented Duke of Albany also attended the classes.

Many classes are self-supporting, but there are innumerable others, especially those for the Naval and Military services, the Mercantile Marine, Police, Firemen, Railway and Dock employés, Colliers, Miners, and the like, entailing very heavy expenses on the Executive, which is much hampered by its limited funds.

I may here say that mixed classes of males and females are on no account permitted, but the usual way to form a class is for the lady or gentleman undertaking to do so, to collect from twenty-five to thirty names, charge each pupil an entrance fee sufficient in amount to cover the expenses, and remit cheque, &c., to the Local Secretary, who will arrange for a lecturer, and for a supply of the necessary material, and communicate in due course with St. John's Gate as to examiner.

From twenty-five to thirty is the best number for a class. It is not desirable to have more than thirty, or the instructor cannot devote sufficient time to each pupil. *In the case of a female class a small boy should be hired for demonstration of bandaging.*

In the case of classes for sailors, soldiers, policemen, and firemen, railway employés and others who can only afford to pay a nominal entrance fee, the balance of expenses must be defrayed either out of the general funds of the Centre, or by means of special subscriptions raised locally. Employers of labour also frequently contribute towards the expenses of classes attended by their employés, so that you will perceive that there is no real difficulty in putting yourselves in working order, having once obtained a sufficient number of names, as the Local Secretary will supply you with all the requisites for practice; of course, I am now supposing that the town in which you reside is an Ambulance Centre, and on my looking through the list I find that a great many of our branches are singularly fortunate in that respect, and supposing yours is not a centre, if you are desirous of assisting in this good work why not do your best towards the formation of one. I feel certain that if a deputation of enginemen and firemen were to wait upon some of your local magnates, you would succeed. There requires no bowing or cringing to those possessed of wealth and influence in a work of this description, for it is a work of love, and the following is the recognised mode of forming a centre.

It is usual to hold an Inaugural Public Meeting, presided over by the Mayor or other local dignitary, to explain the objects of the movement.

The system adopted is then as follows:—

(*a*) The formation of an influential *local* Committee, with Chairman, Treasurer, and Honorary Secretary.

(*b*) The formation of classes (separate) for persons of both sexes.

(*c*) The securing the services of a competent medical gentleman, who will undertake the duties of Lecturer.

(*d*) The formation of a Ladies' Committee (when requisite).

(*e*) Obtaining the use of a suitable room, such as a Volunteer Drill Shed, Schoolroom, or similar building, or in a private house, where lectures can be delivered.

(*f*) The collection of subscriptions to defray local expenses, and to furnish contributions to head-quarters to carry on and extend the work of the Association.

(*g*) The enrolling for entry in the Register kept at the Head Offices the names of qualified persons who would consent in War time, when British troops are engaged, to assist the Order of St. John in certain capacities, a list of which can be obtained from the Chief Secretary.

You may rest assured that the Association would render you all the assistance possible in your undertaking, and you would have the satisfaction of knowing that you had been instrumental in conferring a boon upon the town in which you reside. And why, indeed, should not enginemen and firemen take the initiative in matters of this description? Bestir yourselves; be up and doing. You have too long remained in the background, the public know scarcely anything of your existence beyond the fact that you control the piece of mechanism that hurries them to their destinations. Having obtained your names, given notice to the local secretary, and obtained a suitable room for practice, a local medical practitioner can generally be found who will lecture gratuitously. I here give syllabus of instruction.

FIRST LECTURE.

A. Preliminary remarks, objects of instruction, &c.

B. A general outline of the Structure and Functions of the Human Body, including a brief description of the Bones, Muscles, Arteries, and Veins. The Functions of the Circulation, Respiration, and of the Nervous System.

C. The triangular bandage, and its application.

SECOND LECTURE.

A. The general direction of the Main Arteries, indicating the points where the circulation may be arrested by digital pressure, or by the application of a tourniquet.

B. The difference between Arterial, Venous, and Capillary Bleeding, and the various extemporary means of arresting it.

C. The triangular bandage.

THIRD LECTURE.

A. The signs of fracture, and first aid to be rendered in such accidents. The application of splints, or other restraining apparatus. Treatment of Sprains.

B. The triangular bandage.

FOURTH LECTURE.

A. First aid to those suffering collapse from injury; to those stunned, to the apopletic, inebriated, epileptic, fainting, and to those bitten by rabid animals.

B. The immediate treatment of the apparently drowned, or otherwise suffocated.

C. Burns, scalds, and poisons. What to do when dress catches fire.

FIFTH LECTURE (FOR MALES ONLY).

A. The improvised method of lifting and carrying the sick or injured.

B. Methods of lifting and carrying the sick or injured on stretchers.

C. The conveyance of such by rail, or in country carts.

FIFTH LECTURE (FOR FEMALES ONLY).

A. Hints on nursing—preparation of the room—the bed, how arranged—requisites for all emergeneies treated of in the foregoing lectures—temperature of room—reading ordinary and bath thermometers.

B. Preparing the patient for bed and placing him thereon in various cases. Administering food, drink, medicine—making and applying poultices of bread, linseed, mustard—fomentations and lotions.

The last half-hour of each lecture is generally devoted to practical work, such as the application of bandages and splints, lifting wounded, and carrying on stretchers.

Now, as I stated in my previous letter, these lectures are of a very interesting and instructive nature.

And I care not how studious a man may have been, he will grasp more of the truth of the saying of one of old that man is fearfully and wonderfully made in the first lecture than in a week's reading of any of the numerous works on physiology. And it will be at once seen from the variety of subjects treated with in the lectures, that an engineman or fireman may become the possessor of knowledge that may not necessarily be called into requisition on the railway only, but in the streets, and at home, or, in fact, anywhere and everywhere ; for instance, he may be going home from his work and see a person who has had an apopletic fit, surrounded by a crowd of people ; now, instead of coming to the conclusion that the person was drunk, which is too often the conclusion arrived at by ignorant persons, he would know by various signs what was the true state of affairs, and, in the absence of a medical man, you might be of great service. I remember a case of this description, in which a member of the Nottingham Loco. Class just arrived upon the scene when a lady, with no doubt the best intentions, was about to pour some brandy down the sufferer's throat, and he had some difficulty in persuading her of the danger in so doing, and he was in some danger of being roughly handled by the people for interfering, however, he was resolute, and rendered first aid after the manner in which he had been taught, and upon the doctor's arrival, was commended for his treatment of the case ; also, that had the brandy been administered the person would most likely have succumbed. Again, you might be called in to see a person who had taken poison, and, from lecture four, you would have learnt that acids and alkalies form antidotes to each other ; also those most suitable for that purpose. Again, you might be of service where persons are found hanging, or apparently drowned, and instead of running for a policeman, as is very often the case where persons are found suspended by the neck, you would be taught that cutting them down, removing tight clothing, and letting the patient have as much fresh air as possible, and endeavouring to restore natural breathing, by means of artificial respiration was your duty ; and in the case of apparent drowning, you would be taught that it was first necessary to restore the breathing before proceeding to induce circulation and warmth ; also how to perform those movements, and many other things of great practical use, which I might go on enumerating did space permit, but I am afraid I shall be hearing of some of you saying that you do not want the pages of the *Journal* all filling with ambulance work, but I will conclude by saying that I hope no one will imagine that this is a money-making affair, so far as the association is concerned, for all that it cost me and the rest of my fellow class mates to obtain our certificates was one shilling each for entrance fee, one shilling for a text book, sixpence each for an illustrated bandage ; total, half-a-crown. Also a little self-sacrifice to attend the lectures and to practice, of course I am aware that some may adduce the argument that the calling of enginemen and firemen would prevent them attending lectures, but why not meet on Sundays, the same as we did, for surely the most puritanical would not object to Sunday meetings for such a humane object. I may also add in conclusion that we met every Sunday afternoon, and, to relieve the monotony of ambulance drill, we established a mutual improvement class, which was opened by singing and prayer, then one of the members would read an essay upon a given subject, which was afterwards discussed by the class ; politics and doctrinal subjects being strictly prohibited, and, I believe, that the class was the means of great moral and intellectual if not spiritual advancement of its members. Trusting that this epistle may be as kindly received as my first, and that we may soon hear of some good work, and of some of the younger members of our fraternity emerging from their seclusion and developing their latent abilities.

I remain, yours fraternally,
Thomas Ball.

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SIGN LANGUAGE.

The American Indians are said to have a silent language of signs, which is used by all alike, and is the medium of communication between all Indians of different tribes. It is frequently used even in family parties, or while on the march, or on hunting expeditions, or at other times when silence is deemed desirable. To the initiated it is as clear and rapid a means of communication as any in use at our deaf and dumb asylums,—indeed, more rapid, as certain signs are used to express whole phrases and symbolic ideas. The whole body is enlisted, and by its twistings and turnings affords a much more varied dictionary than we can extract from our finger alphabet. If a stranger could steal unawares near an Indian camp, he might marvel at the occasional bursts of laughter, while not a human voice was to be heard; yet every individual gathered round the camp fire is all the while drinking in some very interesting story related [by one of their number in the sign language.

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DRINKS.

Tea and coffee are both strong nerve stimulants, and as such should be avoided. They are, in all probability, more responsible for irritability of temper and loss of nerve than any other articles of diet. Cocoa and chocolate are the best of the hot drinks, as they contain a large percentage of valuable nutriment, but they are not to be compared with the nectar of fresh fruit. Milk is an excellent drink for children, but is too rich for general use, and should be generally diluted with water. An immense variety of pleasant summer drinks may be made from fruit crushed into water. The juice of lemons, limes, and all the soft fruits, well diluted with water, will be found the best substitute for wines, cups, beers, &c.

Interesting Extracts.

A REMARKABLE RAILWAY WRECK.

The wreck of two passenger trains on the Rochester—single track—division of the New York, Lake Erie, and Western Railway, one mile east of Avoca, on Tuesday, the 17th of January, was an interesting one, aside from the sad event connected therewith. The train from Rochester, No. 18, was drawn by engine 260, Frank H. Maynard, engineer, and the train from Elmira, No. 107, by engine 69, Frank Marsh, engineer. The blame has been placed upon the train despatcher, but it would seem to be as just to attribute the accident to the system of train management. On the Pennsylvania Company's railways what is known as the "double order system" is in vogue. The train despatcher will call two stations nearest the approaching trains, and issue an order to the engineers and conductors of the two trains to be affected. For instance, "Conductor D and engineer E, train 39, will meet and pass conductor F and engineer G, train 40, at York." The operators will each repeat the order back to the despatcher and wait for his "O. K." before allowing the trains to proceed. On the New York, Lake Erie, and Western, a separate order is issued for each train, repeated, and "O. K.'d," as common to all systems.

The confusion leading to the wreck near Avoca, seems to have arisen from train 18 running behind train 107 instead of ahead, as usual when on time, and the train orders for the two getting confounded in the mind of the despatcher. The despatcher discovered his error, it is claimed, almost immediately, but on calling Avoca could get no response, as the operator had left his instrument to attend to the duties of baggageman or express agent, it being the custom at small stations to place the several titles and duties upon one man. Train 18 was 15 minutes late, and engineer Maynard remarked to his fireman, Frank Marsh, jun., that he would have to "let her out." Both trains make high speed between stations. They met on a sharp curve. Engineer Marsh saw the downcoming train in time to pull the air brake lever and jump, his fireman having preceded him. Engineer Maynard was on the outside of the curve, and presumably did not have as good a view of the track ahead, a bit of woods with thick underbrush bordering the railway on the inside of the curve hiding the track ahead.

The curve is a short one, and on either side lies a mile or more of straight track, so that ten seconds difference in the time of one of the trains would undoubtedly have prevented the accident. Maynard's fireman happened to look ahead from his side of the cab at the right instant, shouted, "There they are, Frank!" and leaped just as the trains came together. Maynard pulled the air-brake lever just in time to set the brakes. It is apparent, also, that he put his head out of the cab window, as if to escape being crushed; but the cab was so broken that the hard wood frame acted like a huge pair of shears, cutting his head completely from his shoulders so that it fell by the side of the track upon the snow. It is apparent that the air brakes saved all others on the trains from instant death. Nearly everyone received a bruise of some kind, but none of them serious. It is seldom that two engines more completely wrecked are seen. Equal to each other in every particular, they met and stood erect as if to wrestle, their driving-wheels wedged together, and machinery almost completely stripped from the boilers. It was probably the most picturesque wreck, so far as the locomotives are concerned, that has occurred for years.

The unlucky incident is worthy the study of railroad managers. The writer is informed that two men, working twelve hours each, do the train despatching on the division where the accident occurred, and he knows personally of despatchers who work eight hours without cessation at their instruments in handling the many trains of a trunk line in New York State, besides doing a large amount of other telegraphic work, and then completing a day's work of eleven or twelve hours, often more, in making out the daily reports. This is done seven days in the week, and vacations come very rarely. Train management requires such a clear head, that it cannot be done efficiently with the despatcher, overworked.

A law limiting the hours of office work for a train despatcher to eight would certainly insure greater safety to the public, and, it would seem, enable the despatcher to handle his multitude of trains with greater facility. Further legislation to secure the constant attention of an operator at his instrument, undiverted by the duties of ticket agent, baggage or express agent, also seems advisable. Accidents so destroy public confidence in the safety of a railway that not only destroyed life and property, but diminished patronage, must be counted in footing up the loss.

The coroner's jury which investigated the cause of the death of the engineer Maynard found that an error had been committed in the train despatcher's office at Rochester. The jury also found, "The company required train despatcher Sauerbier to keep an account of, and report daily all cars ordered, received, and on hand at date on the divisions of which he had supervision. The said divisions comprised about 170 miles of track, over which thirty-six trains passed daily. His duties as despatcher required him to serve continuously twelve hours out of the twenty-four. We recommend that the railroad company employ a person other than the despatcher to keep and make such car reports. We further find that said despatcher had more duties to perform at the time of making such error than should have been required."—*Scientific American.*

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QUAINT MARRIAGE CUSTOMS.

Very quaint are marriage customs among the peasantry of Lithuania. A stranger in their midst would hardly understand—indeed, would be likely to make inquiries concerning—the ornamentation of the window fronting the thoroughfare: "A little tree or flower-pot in full view of passers-by, or it may be a knot of pink and blue ribbon." To the initiated not unaccustomed to the sight it would at once make known in this delicate way that the house-father there dwelling has a comely daughter, and that a suitor for her hand would be courteously received. Weddings in Lithuania are always solemnised in church on Sunday. If the contracting parties are "well to do," and brilliant effects are desired, there is a grand lighting up of the edifice. The bride enters, escorted by two young men, and bridesmaids follow, all in festive garments, their heads crowned with flowers. Following closely is the bridegroom, attended by several comrades, and the two mothers close the procession. The officiating priest stands before a table, upon which have been placed a crucifix and candles; the couple take their places before him, cry heartily; the bride must during the entire service. Should she feel inclined to take a cheerful view of it, and forget the courtesy of tears, she will meet with swift and telling rebuke from certain old women, friends of the family, whose business it is to look after the proprieties, they with forceful words compelling her to weep. It is regarded as very bad manners to express joy on such an occasion. Feasting continues for many days; the mother of the bride gives the first party, the bridegroom the second. While in full enjoyment of the national dance, a queer sort of jig, and performed by several couples at once, the newly married slip away and go to their own house. Relatives may continue the festivities at pleasure.

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THE GREAT STRIKE ON THE CHICAGO, BURLINGTON, & QUINCY RAILWAY.

The great strike of the employés on this railway, which we noticed in our American Notes of last week, still continues, and intelligence from Philadelphia, dated 28th ult., states that it was so nearly universal on the road that it had almost paralysed the working of the railway to furnish men for the removing of the mail-cars. Scarcely any other traffic is proceeding, and some 1,600 drivers and stokers are idle. The company has discharged 600 goods handlers as the goods trains have been stopped. An accident has been caused by an unskilled driver at Napierville, Illinois, in which six persons were injured. About 200 drivers who have been enlisted in Pennsylvania from among the men who struck on the Philadelphia and Reading Railroad have gone to Chicago for employment. The other railways honour the through passenger tickets of the Chicago, Burlington, and Quincy Company, thus preventing a total embargo. The strikes deprives 10,000 men of employment.

The men who have struck work decline even to move the mail-cars, hoping that the company will fall into a difficulty with the Government by not fulfilling its mail contracts. Some desultory movements of passenger trains were attempted on the 28th ult., including the conveyance of the through mails, which the railway managers accomplished without serious delays. The strike attracts great attention as the Brotherhood of Locomotive Engineers which is conducting it is regarded as the fairest of all the trade unions, and rarely orders a strike.

Further particulars state the strike is unique in the long history of American strikes. It was ordered by the Brotherhood of Locomotive Engineers, the most intelligent and conservative labour organisation in the country. Its president, Mr. P. M. Arthur, is an able man, who has always used his influence against strikes like most of those brought about by the Knights of Labour, and against all violence. In the present case he did not order the men out until after a full discussion with the company, and a complete failure of the negotiations for the settlement of the difficulties. He then gave formal notice to the men to leave work, to make no attempt to interfere with the company's business and to offer no opposition to the employment of new men.

The promise has been fulfilled to the letter. The men left work quietly, and there has not been the slightest disturbance. The company has about 6,000 miles of line in Illinois, Iowa, Missouri, and Nebraska, and the system extends from Chicago, as far west as Denver, a thousand miles in nearly a straight line. The strike was ordered on a simple question of wages, the men demanding the same pay for all grades, instead of varying as at present, according to the length of service. It was thought at the outset that the Knights of Labour, whose methods Mr. Arthur severely criticised in the past, would take sides against the men, but they have issued formal orders forbidding aid to the railway company in any form, and directing the members not to take the places of the strikers. The company says it is receiving many applicants from all parts of the country, and intends to fight to the end. It is doubtful which side will win. Mr. Arthur's organisation numbers 25,000 men, and comprises nearly all the most intelligent engine drivers in the country.

The latest intelligence states that the company is obtaining numerous engine-drivers and stokers, and is now effecting some improvement in the passenger traffic, though the goods traffic has entirely ceased. Conferences have been entered upon with a view to a settlement, but at the time of writing nothing definite had been agreed. At a meeting of engineers representing all the railways running into New York. which was held on Sunday last, it was resolved to support the men on strike, even to the extent of stopping all the railways in the country. All the members of the Brotherhood of Engineers and Firemen employed on the Chicago, Burlington, and Northern Railway, numbering about 100 men, struck work on Monday night in consequence of that line continuing to exchange traffic with the Chicago, Burlington, and Quincy Company.

In the House of Representatives at Washington, on Monday, a resolution was brought forward for the appointment of a committee to investigate the cause of the strike, and to act as mediators for securing an amicable settlement of the dispute.—*Railway Herald.*

TRIBUTES TO WOMEN.

GEMS FROM THE POETS, PREACHERS, AND SAGES OF MANY LANDS.

Confucius: "Woman is the masterpiece."

Herder: "Woman is the crown of creation."

Richter: "No man can live piously without a wife."

Voltaire: "Women teach us repose, civility, and dignity."

Lessing: "Nature meant to make woman its masterpiece."

Ruskin: "Shakespeare has no heroes—he has only heroines."

"Whittier: "If woman lost us Eden, such as she alone can restore it."

John Quincy Adams: "All that I am, my mother made me."

Gladstone: "Woman is the most perfect when most womanly."

Cabanis: "In wishing to extend her empire, woman destroys it."

E. S. Barrett: "Woman is last at the cross, and earliest at the grave."

Boucicault: "I wish Adam had died with all his ribs in his body."

Saadi: "A handsome woman is a jewel; a good woman is a treasure."

Lamartine: "There is a woman at the beginning of all great things."

Bulwer: "To a gentleman, every woman is a lady in right of her sex."

Victor Hugo: "Women detest the serpent through a professional jealousy."

Cowley: "What is a woman? Only one of nature's agreeable blunders."

Rochefoucauld: "A fashionable woman is always in love with herself."

Shakespeare: "There was never a fair woman but she mouths in a glass."

Francis I.: "A woman changes oft; who trusts her is the softest of the soft."

N. P. Willis: "The sweetest thing in life is the unclouded welcome of a wife."

Cervantes: "All women are good—good for nothing or good for something."

George Elliot: "A passionate woman's love is always over-shadowed by her fear."

Heine: "Handsome women without religion are like flowers without perfume."

Cervantes: "Between a woman's 'yes' and 'no' I would not venture to stick a pin."

Voltaire: "All the reasonings of men are not worth one sentiment of a woman."

Beecher: "Women are a new race, re-created since the world received Christianity."

Leopold Schefer: "But one thing on earth is better than the wife—that is the mother."

Luther: "Earth has nothing more tender than a woman's heart when it is the abode of pity."

Shakespeare: "For where is any author in the world teaches such beauty as a woman's eyes?"

Michelet: "Woman is the Sunday of man; not his repose only, but his joy, the salt of his life."

Margaret Fuller Ossoli: "Women is born for love, and it is impossible to turn her from seeking it."

Louis Desnoyers: "A woman may be ugly, ill-shaped, wicked, ignorant, silly, and stupid, but hardly ever ridiculous."

Lord Lonsdale: "If the whole world were put into one scale and my mother in the other, the world would kick the beam."

Malherbe: "There are only two beautiful things in the world—women and roses; and only two sweet things—women and melons."

Bulwer Lytton: "O, woman! in ordinary cases so mere a mortal, how in the great and rare events in life dost thou swell into the angels!"

Saville: "Women have more strength in their looks than we have in our laws; and more power by their tears than we have by our arguments."

Anna Cora Mowatt: "Misfortune sprinkles ashes on the heart of the man; but falls like dew on the head of the woman and brings forth germs of strength of which she herself has no conscious possession."

Humorous.

AN INFERNAL MACHINE.

A rather sad affair took place on one of our streets the other day. A young lady with her arms full of bundles emerged from a dry goods store, when one of them fell on the side walk without her noticing it. Just behind her was a young man, and an Elmira young man who is not polite is not anything, and he quickly stepped forward to pick it up. Now a bundle done up in a piece of paper with a dry goods advertisement on it is apparently as harmless as a mother's spanking, and there it lay guileless as an angle-worm on a sidewalk after a rain. Just as he stooped to pick it up there was a rustling of the paper, the twist began to come out at the ends, and in another instant a bright, red thing, a sort of a cross between a balloon and a devil-fish, flew into the air before his eyes and a No. 10, thirty-six, double-jointed, duplex-elliptic, steel-bowed, bustle-attachment, $1.50, red-headed hoopskirt waltzed around and gyrated and opened and shut up and fell on the sidewalk as flat and thin as a restaurant pie; and the young man straightened himself up, looking as if he wished the tail of comet No. 2 would sweep him from this fair land, and the young lady came back with a face that resembled a sunset on a fifty-cent chromo, and she picked up the wire contrivance, and then she went towards the east and he went towards the west, and the sun ducked his head behind a cloud to hide a smile, and three or four looked on, laid down and laughed, and doubled themselves up in a manner that would have made a mess of green apples hang their heads in shame.—*Elmira paper.*

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PRINTERS' ERRORS.

A compositor belonging to the *San Jose Herald* was requested to "liven up" a certain speech delivered at the Working

Men's State Convention, held in that town; with the usual remarks in parentheses. The "jour," who was carrying a little more beer than necessary just then, got hold of the wrong part of the proceedings, causing the eloquent resolution of Mr. Van Arman, referring to the death of a member, to read something like this :—" *Whereas*, there has unfortunately been removed from our midst our beloved comrade, Azariah McDuck—(loud applause)—who has been cut down in the flower of his usefulness—(laughter)—and promise, it is *resolved* that we tender to his bereaved family—(cheers)—and friends our sincere sympathy in their hour of affliction—(cries of 'Put him out' and 'Order') —and assure them that while we humbly bow to the will of—(a voice : Three cheers for Kearney)—Heaven, we lament in our departed brother—(roars of laughter)—a fellow-citizen of enlightened mind, statesmanlike views—(cries of 'Oh ! shut up' 'Let's adjourn ')—and broad and generous sympathy for his kind. (Terrific cheers.) He is not lost but gone before. (Derisive cries of 'O! cheese it,' and continued laughter)," &c.

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JOURNALISM IN TENNESSEE.

By Mark Twain.

"That is the way to write," said the chief editor, "peppery and to the point. Mush-and-milk journalism gives me the fantods."

About this time a brick came through the window with a splintering of a crash, and gave me a considerable of a jolt in the back. I moved out of range—I began to feel in the way.

The chief said, "That was the Colonel, likely. I've been expecting him for two days. He will be up now, right away."

He was correct. The Colonel appeared in the door a moment afterwards with a dragoon revolver in his hand.

He said, "Sir, have I the honour of addressing the poltroon who edits this mangy sheet ? "

"You have. Be seated, sir. Be careful of the chair ; one of its legs is gone. I believe I have the honour of adressing the blatant scoundrel, Col. Blatherskite Tecumsen ? "

"That's me. I have a little account to settle with you. If you are at leisure we will begin."

"I have an article on the 'Encouraging Progress of Moral and Intellectual Development in America' to finish, but there is no hurry. Begin."

Both pistols rang out their fierce clamour at the same instant. The chief lost a lock of his hair, and the Colonel's bullet ended its career in the fleshy part of my thigh. The Colonel's left shoulder was clipped a little. They fired again. Both missed their men this time, but I got my share, a shot in the arm. At the third fire both gentlemen were wounded slightly, and I had a knuckle chipped. I then said I believed I would go out and take a walk, as this was a private matter, and I had a delicacy about participating in it further. Both gentlemen begged me to keep my seat, and assured me that I was not in the the way. I had thought differently up to this time.

They then talked about the elections and the crops awhile, and I fell to tying up my wounds. But presently they opened fire again with animation, and every shot took effect—but it is proper to remark that five out of the six fell to my share. The sixth one mortally wounded the Colonel, who remarked, with fine humour, that he would have to say good morning now, as he had business up town. He then inquired the way to the undertaker's, and left.

The chief turned to me and said, "I am expecting company to dinner, and shall have to get ready. It will be a favour to me if you will read proof and attend to the customers."

I winced a little at the idea of attending to the customers, but I was too bewildered by the fusillade that was still ringing in my ears to think of anything to say.

He continued, "Jones will be here at three—cowhide him. Gillespie will call earlier, perhaps—throw him out of the window. Ferguson will be along about four—kill him. That is all for to-day, I believe. If you have any odd time, you may write a blistering article on the police —give the Chief Inspector rats. The cowhides are under the table—weapons in the drawer—ammunition there in the corner—lint and bandages up there in the pigeon holes. In case of accident, go to Lancet, the surgeon, downstairs. He advertises—we take it out in trade.

He was gone. I shuddered. At the end of the next three hours I had been through perils so awful, that all peace of mind and all cheerfulness had gone from me. Gillespie had called and thrown me out of the window. Jones arrived promptly, and when I got ready to do the cowhiding he took the job off my hands. In an encounter with a stranger, not in the bill of fare, I had lost my scalp. Another stranger, by the name of Thompson, left me a mere wreck and ruin of chaotic rags. And at last, at bay in the corner, and beset by an infuriated mob of editors, blacklegs, politicians, and desperadoes, who raved and swore and flourished their weapons about my head till the air shimmered with glancing flashes of steel, I was in the act of resigning my berth on the paper when the chief arrived, and with him a rabble of charmed and enthusiastic friends. Then ensued a scene of riot and carnage such as no human pen, or steel one either, could describe. People were shot, probed, dismembered, blown up, thrown out of the window. There was a brief tornado of roaring rage, with a confused and frantic war dance glimmering through it, and then all was over. In five minutes there was silence, and the gory chief and I sat alone and surveyed the sanguinary ruin that strewed the floor around us.

Poetry.

ORIGINAL POETRY.

The following original poem was composed by the secretary of the York Branch, Samuel Roe, during a long and serious illness.

"My Grace is sufficient for Thee," II. Corinthians, 12 c. 9v.

I know it is true, gracious Lord,
  In whate'er condition I be,
Because it is Thou who hast said,
  My grace is sufficient for thee.

Thy grace was sufficient for Paul,
  Sufficient it will be for me;
Dear Saviour, I would hear Thee call,
  My grace is sufficient for thee.

If suffering or sorrow are mine,
  I know it is ordered by Thee;
I cannot compare it with Thine,—
  Thy grace is sufficient for me.

I once was the victim of sin,
  But Christ Jesus has made me free:
For, called and accepted by Him,
  His grace is sufficient for me.

If Satan should tempt me to stray,
  I'll point him to Christ on the tree;
And tell him that "He is the Way,"
  His grace is sufficient for me.

Then come, brother, why doubting stand,
  The angels are waiting to see,
Give Jesus thy heart and thy hand,
  His grace is sufficient for thee.

Delay not, but listen, He calls,
  Ye weary ones come unto Me;
Whatever on earth thee befalls,
  My grace is sufficient for thee.

Then when you reach yonder bright home,
  A crown will be given to thee;
I hope to join you in the song,
  His grace was sufficient for me.

PROTECT THE TRAIN, BOYS.

BY JOHN KEYNTON.

Duty? You tell about duty!
You didn't know Jim, did you?
A braver and likelier fellow
There's nobody ever knew.
His engine was just the neatest
That ever was rolled along;
He'd always a smile so cheerful,
A kindly word or a song.

Married? No; but he'd a sweetheart,
The prettiest little girl,
With cheeks like a blushing rose-bud,
And teeth like a row of pearl.
Whenever he passed her cottage
A wave of his manly hand,
Would carry his kisses to her—
Oh, well; she would understand!

One night, 'twas the Lightning Express
He piloted on that trip,
He started to leave the depôt,
With a smile on his cheek and lip:
And singing a cheery love song,
He rattled along the rail:
And watched for his sweetheart's cottage;
To signal he'd never fail!

Past woodland and gleaming house-lights
He hurried in joyous glee,
"I know," said he, "she'll be waiting
A signal to-night from me:
A whistle three times repeated,
And then she will know all's right."
But there was a danger lurking
For Jim, there, ahead, that night.

The night it lowered wild and stormy,
The rain it came sweeping down,
The sky it was seamed with lightning
From the earth to heaven's crown.
But cheerfully on he glided,
For thoughts of his sweetheart there
Made even the frowning storm-clouds
As bright as the sunlight fair.

And over a darksome meadow
He watched for a gleaming light—
The star of his hopes and gladness,
That shone thro' the darkest night.
At last like a spark he saw it,
And wildly, and fierce and shrill,
Rang out on this gloom his whistle,
Three times over vale and hill.

"I know she is watching for me,
I know she is looking out,
Her face at the pane is shining;
My angel is there, no doubt,"
He murmured, and gazed intently,
Just as a lightning's flash.
Showed him the little cottage,
And then came the thunder's crash.

Not long would he leave her lonely,
But ere the red leaves would fall,
He knew that his trusting sweetheart
Forever his own he'd call.
So glancing ahead he murmured,
"God keep her, my darling sweet,
Till after this trip is ended,
And again we shall fondly meet."

Around the curve they came sweeping,
When there on the forward track,
A land-slide had heaped its ruin;
The speed 'twas in vain to slack.
No mortal could stay that engine,
A demon in wild affright.
It dashed at the barrier fallen
That dismal and fatal night.

And Jim? Crushed and bleeding beneath it,
As soon as his lips could speak,
Looked up at the help that came,
His body fast growing weak,
He spoke not of yonder sweetheart,
But moaned in his dying pain,
"I'm gone, boys; but don't you mind me,
Go back and protect the train."

And then, in a moment, silent,
His spirit had heavenward flown.
Just as around the curve there
The lamp of the up-train shone.
Monument, sir, for a hero?
Well, stranger, its just my whim,
That you never will find another
The equal of this, our Jim.

ABSENCE OF MIND.

[Scene: A Pulman car. An absent-minded passenger suddenly arises from his seat and looks aimlessly around him.]

"A heavy weight is on my mind!
I know I've left something behind!
It cannot be my hat-box? No!
It safely rests the seat below!
It must be, then, my new umbrella,
My wife will taunt me when I tell her.
'Your fifteenth since the glad New Year!'
Why, bless me, no? How very queer!
'Tis in the rack there, plain in sight!
My purse and ticket are all right!
What fancies crowd an addled head;
There's naught amiss! I'll go to bed."

Full peacefully he sank to rest,
If snores a peaceful sleep attest.
A tuneful hour had scarce slipped by,
When loud uprose an anguished cry—
A crazed man's moan of lamentation—
"I've left the baby at the station!"

* * *

A POEM WITH A POINT.

Only a pin; yet it calmly lay
On the tufted floor, in the light of day,
And it shone serenely fair and bright,
Reflecting back the noonday light.

Only a boy; yet he saw that pin,
And his face assumed a fiendish grin;
He stooped for a while, with a look intent,
Till he and the pin alike were bent.

Only a chair; but upon its seat
A well-bent pin found safe retreat;
Nor had the keenest eye discerned
That heavenward its point was turned.

Only a man; but he chanced to drop
Upon that chair, when—fizz! bang! pop!
He leaped like a cork from out a bottle,
And opened wide his valve de throttle.

Only a yell; though an honest one,
It lacked the element of fun;
And boy and man, and pin and chair,
In wild confusion mingled there

Correspondence.

NOTICE TO CORRESPONDENTS.

We do not hold ourselves responsible for the opinions expressed by Correspondents.

We reserve to ourselves the right to publish or reject any correspondence.

Rejected correspondence will not be returned unless accompanied by a stamped envelope.

All correspondence to be written on one side of the paper only.

We shall be glad to receive articles of interest and information on Railway Work, Machinery, &c. (English or Foreign), interesting Stories of Railway experiences, information of accidents, or any subject of general interest.

All correspondence to be addressed to Mr. T. G. Sunter, General Secretary, 17, Mill Hill Chambers, Leeds.

To the Editor of the Associated Society of Locomotive Engineers and Firemen's Journal.

Sir,—It was with great pleasure that I read in your last issue the suggestion of a member of Liverpool Branch, in reference to the establishment of a Widows' and Orphans' Fund, in connection with our Society. It is without doubt one of the necessities of the times. But in order to be successful, it should be made self-supporting, so as not to be necessary to appeal to an often-wearied public for funds, for in connection with our Society's affairs, as in other matters, we must learn to be self-reliant, and by doing so, gain the respect of those around us. The suggestion made by your correspondent, viz., 5/- enginemen, 2/6 firemen, and 1d. per week afterwards, is, no doubt, a reasonable one, but may be met by the objection that all would participate in the benefits, all should pay alike. But this subject could be ventilated among the branches, and if met in the right spirit, all being willing to make a sacrifice, a Widows' and Orphans' Fund may soon be a reality, as it could be managed with little expense for management, if the officers would do their work voluntarily, which I believe they would, and with the honorary members' subscriptions added, there seems every reason to believe that the fund would be a success. I trust, sir, that this important subject will be taken up by the branches, and members generally, believing that the establishment of such a fund would be the means of alleviating much want and suffering, also cementing the bonds of unity among us, and increasing the membership of our Society, and extending its usefulness.

I remain, yours respectfully,
A Member (No. 5) Branch.

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York Branch,
April 3rd, 1888.

Dear Sir,—Since the formation of the York Branch in 1884, we have continued to make steady progress, never at any time going in the downward course, although some of our members have been transferred to other branches in consequence of removal, and a few have allowed themselves to run out of benefits, we have not only been able to fill up the gaps thus caused, but to add to our numbers.

We have 42 members' names on the books at the present time, and I find the names of 17 men in the books who have from various causes ceased to be members of our branch.

We have cause for thankfulness when we remember that our branch has only been visited by that grim monster, "death," on one occasion, when we had removed from our midst a promising young fireman named F. Sim, who was a protection member, and thinking of joining for full benefits. Before, however, he had fulfilled his intention, he succumbed to an attack of typhoid fever.

No full benefit member, or member's wife, has yet been called upon to feel the pangs of separation, and we sincerely hope we shall long have a similar record in this respect.

I have great hopes not only for York Branch, but for the Society generally, for I truly believe that many of the most sensible enginemen and firemen are beginning to recognise in the Society "The salvation of their position as enginemen," which I am sorry to notice has a great tendency to deteriorate.

I think, sir, our motto should be "Excelsior," and I believe it is with this view every member of our branch patronises our excellent *Journal*, which is destined to do a good and great work.

Wishing you every success.

Truly yours,
The Secretary.

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Mr. Editor.—Sir,—Let us be as charitably disposed as we may, there is no denying the fact that non-society men are a sprag in our wheel of progress, and I think the following extract from a speech by Mr. William Crawford, M.P., to the Durham miners, in which he made the following striking remarks concerning non-society men, may be of some interest to enginemen and firemen in your Society. "This matter has for some time been causing some uneasiness in some portions of the country. That some feeling should be aroused towards a body of men who act as non-society men, does not surprise me, men outside an organisation of their own trade are never good, but as a rule bad, and bad only, but you should be at least consistent. While you refuse to descend and ascend with these men you walk to and from the pit, nay, sometimes work with them, you mingle with them at home over your glass of beer, in your chapels, and side by side you pray with them in your prayer meetings. The time has come when there must be plain speaking on this matter, it is no use longer playing at shuttlecock in this important portion of our social life. Either mingle with these men in the shaft as you do in other places, or let them be ostracised at all times and in every place. Regard them as unfit companions for yourselves and your sons, and unfit husbands for your daughters. Let them be branded, as it were, with the curse of Cain, as unfit to mingle in ordinary honest and respectable society. Until you make up your minds to completely and absolutely ostracise these goats of mankind, cease to complain as to any results that may arise from their action."

Yours,
F. R.

OUR MONTHLY JOURNAL.

To the Editor.

Dear Sir,—I have had the first number of our *Journal*, and I must say I am surprised—most agreeably surprised. I have, for some considerable time, been picturing to myself what the Journal would be like *The Railway Review*, *The Train*, *Railway Signal*, or any of the several other papers upon railway matters. When, lo and behold ! it is an own brother to a high-class magazine, suitable, not only as a source of recreation and instruction for myself, but equally enjoyable and instructive to my wife ; and by taking care of each number, and having them bound in volume form, be eventually a source of enjoyable, recreative instruction to our children. All whom I have shown or sold a *Journal* to, like it very much, and predict its success. I hope each of our members will, whenever they hear any say they like the *Journal*, impress upon them the desirability of liking it to the extent of 2d. per month.

Wishing it a long, useful, and prosperous life,

I am, &c.,

Cardiff.

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A meeting of enginemen and firemen of the Taff Vale Railway Company was held in the Town Hall, Cardiff, on Sunday, March 11th, to receive the report of a deputation appointed to wait on the locomotive superintendent, to present a memorial for the redress of several grievances, amongst others being—"The great number of hours many men are compelled to remain continuously on duty ; the unsatisfactory system that now obtains of working main-line trains with supernumerary pilot drivers ; and requesting the re-instituting the payment of premium to drivers, as before the concession in hours." The deputation gave a *resumé* of what transpired between them and the superintendent, who, they said, promised that all the grievances should be fully considered and an answer sent, at an early date, to the Committee. As to the long hours, the superintendent said, they were in a great measure due to delay, caused by circumstances over which the officials had no control. Any suggestion by which these delays could be obviated would receive due consideration. In fact, at two stations pilot engines had been stationed, where, it was suggested, they would be advantageous in relieving main-line trains. The deputation said that did not remove the evil, as many of the pilotmen were compelled to remain on duty from 24 to 36 hours continuously. Much feeling was evinced by the meeting at not having a definite reply, as sufficient time had elapsed for due consideration.—A deputation of guards, shunters, &c., was then introduced to the meeting. They petitioned for a renewal of the unity of action, as carried out by the General Committee during the years 1880 to 1884. A guard made a very ingenious speech, in which he desired the loco. men to forget any petty annoyances to which they had been subjected by the traffic men since the dissolution of the General Committee, and to assist in bringing about this very desirable (from the guards' point of view) amalgamation. After some warm discussion, a driver moved, "That the two Committees be amalgamated." About 20 voted for the measure, and by the dissentients refusing to vote, although in an overwhelming majority, it was declared "*carried*," and this unworkable coalition Committee is a *fait accompli.*—With the usual vote of thanks, the meeting dissolved.

The following letter appeared in the local paper on Saturday, March 17th :—

"AMALGAMATION.

"TO THE EDITOR.

"Sir,—The Taff train men apparently have been inoculated with the amalgam-lymph, for on Sunday last the enginemen, at a meeting in the Town Hall, decided, on petition, to again amalgamate with the train men to try and obtain redress of several alleged grievances. If my memory serves me rightly, it was decided in 1884, at a joint meeting of enginemen and train men, that it was injudicious for the two departments to be amalgamated, as their interests were not identical, and the officials would more readily listen to reasonable argument from those in their own department than from outsiders; but I suppose since then the guards have learned much about the engine, its needs, the economical use of coal, stores, &c.; and the drivers have learned the use of the coupling stick, brake stick, &c., as I presume by amalgamating they intend going, each party from his own department, to argue upon matters which concern not themselves but others. One would think the drivers had enough of amalgamation when they paid so heavily for the concession in hours, and have ever since had to bear the ill-concealed sneers of many who benefited by that concession. If drivers or guards have a grievance, why not go to the heads of their separate departments, and, failing redress, ask to have the matter placed before a higher authority, and not ask others to assist them in doing what they ought to be able to do without extraneous aid. Do fitters, engineers, or any other trade, when they have a grievance, ask their labourers or others to assist them? I think not. Then why should enginemen require the assistance of guards, shunters, &c., or *vice versa?*—I am, &c.,

"Loco."

* * *

To the Editor of A. S. L. E. and F. Monthly Journal.

Sir,—Allow me to congratulate you and the Society at large on the appearance of our *Monthly Journal*, which I trust may have a long, useful, and brilliant career, and be the means of propagating the Society until we have the whole of the enginemen of Great Britain within our ranks. It is some years since I first addressed the enginemen and firemen of the country on the subject of amalgamation of the "two societies," but nothing has come of it except that men will say it is a good thing if it could be done, and there it is allowed to remain. I have not the figures near me, but I think there are over thirty thousand enginemen and firemen on the railways of the United Kingdom, while there are not more than eleven or twelve thousand who think it worth a thought to protect themselves by paying into a Society of their fellow-workmen, the greater number pay into the "Old Society," which is pure and simple a friendly society, and a good one; a smaller number pay into the A. S. L. E. and F., or the new Society, whilst a yet much smaller number pay into the A.S.R.S., so that it is not two but three societies enginemen, *who are* society men, try to keep up, whilst the great bulk of the men, some 18,000, are heedless alike of their own and their fellows' welfare. Is it any wonder we are continually reading of meetings on this line and the other, and of the great amount of dissatisfaction there is on the various lines amongst loco. men? The resolutions that are passed, and the tall talk that is indulged in, until the men, stung to madness by either real or fancied wrongs, commit themselves to a strike, as did our brothers on the Midland a short time since, ill-arranged and lacking that combination which would have insured success; is it any wonder that it should have collapsed and ruined hundreds, if not thousands, of comfortable homes, and cost the three societies a good deal of their funds, as the strength of a chain is its weakest link, so with the non-society men of Great Britain is the strength of the men? Those men are our weak link, and, in my mind, very little stronger links in the chain are the men who do not try all they can to join even the *whole* of the society men in one Society to protect your labour. It was the non-society men who caused the Midland strike, it was they who ruined their brothers, it is they who are answerable for all the misery that strike has entailed, and the effects of it will fall on them again, for other directors or high officials will try to make their lines be worked cheaper than others, and knowing the divided state you are in and the apathy and cowardice of the greater number of the men, will put the screw on until they make even the coldest-blooded amongst you *shriek* out, meet *resolute*, &c., until you again sting the more manly amongst you to again resist, with the usual results, and so on to the end of the chapter. Then why in Heaven's name cannot you see it is your own interests to join altogether in "One Society;" help each other, by doing so you help yourselves; sink all your petty jealousies, and pull together. I see in your first issue an article on "The Unemployed Midland Railway Strikers," and knowing that the Societies have done all they could for their members, leads me to ask what has the enginemen and firemen of the United Kingdom done for those men, who, had they been successful, would have been lauded to the skies, because it would have cost nothing but talk. I have not heard that the enginemen, as a body, have felt in their breeches-pockets to help the poor fellows that have been beaten in the strife; no doubt but the men would do it, but you have no organisation. Another reason why there should be only one Society, and *all* should belong to it. This is the third time I have appealed to enginemen and firemen of the country to amalgamate their Societies, and will keep pegging at it until I see it an accomplished fact.

I am, Sir,
Yours truly,
An Old Engineman.

* * *

Sir,—As I have read our valuable journal and found it to consist of some very good information towards enginemen, I think we are all duty bound to do our best to get such a journal circulated through our railways, and every member should try and do their best for it in writing upon any subject as they think would be beneficial to their fellow-members.

I ask you myself if you would be so kind as to give me space in the journal to write upon a subject that wants a great deal of consideration:—enginemen's certificates.

I find it has been introduced into the House of Commons, by Mr. Charles Fenwick, M.P., but I am sorry to say that it has been put down again until they have more time to proceed with it.

I am very sorry to say, Mr. Editor, that I find amongst our fellow-workmen so much prejudice existing in their minds, the one thing we need so much, as the effect of these certificates upon engine drivers, would be most beneficial as it would raise their status and make their position more secure.

Had it have been in the recent Midland strike for the men to have been able to produce a certificate of competency, how much better it would have been for them, but where it was, they had to fall to the ground. Is any sort of a man to take their position as long as the employers got their turn served, the sooner all enginemen get combined in one grand association, the better it will be for us, and be prepared for it, and I hope every engineman will give it study and wish it God speed, as we are really helpless at present in obtaining our just rights and privileges, and are looked upon with no more esteem than the common labourer. I have no doubt that some will say it is all very well so-and-so talking about certificates, he is a bit of a scholar. I think myself, it is as fair for one as another. There are books printed this day by our esteemed friend, Mr. Michael Reynolds, as will enable every one to study for himself. We are certain we shall not be able to obtain one with getting as near the fire an we can and looking up the chimney. We must study for ourselves, and be ready to answer any question that is put before us.

The other day I had a very long controversy with a friend of mine upon this subject. He was a late engineman, but has recently been discharged for a frivolous thing, and had it have been properly investigated, I have no doubt he would have been reinstated. Now this man spoke very much against the certificate. He went as far as to say that we never should have them as long as railways stood. Why he could not really tell me. If we had told the pioneers of railways that trains would run at the speed they do at the present time, and would be brought to a standstill in such a short distance, they would have said we were fit for a lunatic asylum, as there were many told George Stephenson he was when he commenced the first railway, and we find the people to talk in the same strain yet.

Dear fellow-workers, do not let us look at the dark side and give up in despair, but grasp it with a firm belief, and be sure we shall get them, so that we shall have something to fall upon at a future time.

As I think myself, every man in charge of a boiler has a right to be a competent man, as we have known cases, and read of such boiler explosions all through incompetent men being in charge of the same.

There will, however, be much opposition with many employers of labour, as it will deprive them of the cheap and underpaid labour they now employ. It is this latter class who render the passing of the bill imperative as to their parsimonious policy in not paying a proper man adequate pay that so many boiler explosions occur, so that legislation becomes necessary.

I also think every man before he ought to take charge of locomotive, ought to undergo a proper examination, and prove that he is a qualified man.

I wonder how many Midland men there are would have given anything if they could have produced a certificate of competency in foreign lands, where they have gone to seek employment.

I have said many times Midland enginemen were a pattern of this country at one time, and were looked upon with such respect, and it was a great pity they were not possessed of a certificate. I hope I am not intruding too much on our journal, as I wish every success to it, and every member will obtain one, and non-members come and join us and increase our strength.

I remain,
Yours faithfully,
A M. S. & L. Fireman.

N.E. DRIVERS' AND FIREMEN'S WAGES.

Dear Mr. Editor,—I notice in your first and February number of the *Engineers' and Firemen's Monthly Journal*, a scale of wages purporting to have emanated from the North-Eastern enginemen and firemen, or at least from their would-be legislators.

Now, sir, I cannot lead myself to believe that such a clumsy composition has had its birth at a meeting composed of drivers and firemen only. If so, I would like to ask them if they had taken leave of their senses during the time they were engaged in drawing up the programme.

I am quite anxious about the future of enginemen and firemen, if they are willing to allow their interests to be tampered with in this manner.

Just imagine, sir, our going back to the 3rd and 2nd rises, to which we had hoped Mr. McDonnel had given the death blow some time ago.

I am aware that there never was a time when enginemen and firemen had greater cause of complaint. But let me advise them to go about it wisely and cautiously, and not trust their affairs in the hands of other grades, but get combined in one grand organisation of enginemen and firemen, to seek to obtain a certificate of practical competency, and then we shall be able to not only ask, but we shall receive.

Yours truly,
Ousebank, York.

* * *

ANSWERS TO QUERIES.

Sir,—In answer to the question, Will water be converted into steam at a lower temperature than 212°? It will not, as the boiling point of water is 212°. We will take, for instance, a pail full of powdered ice, and bring it into a room in which is a large fire, put a thermometer into the pail amongst the ice, and when the latter begins to melt, the former will stand at 32°, and as long as there is a bit of ice to melt, it will remain at that point, notwithstanding the heat of the room. Now, there must be a large amount of heat entering the water since the ice began to melt, but it has no effect upon the thermometer, and this heat that has so entered is called the latent heat of water. But the instant the last bit of ice is melted the thermometer will begin to rise till the water boils, when it will stand at 212° Fahrenheit; but, although the water goes on receiving heat after this, the instrument will stand at 212° until the water is all boiled away. The heat that enters the water from boiling till it becomes steam is called the latent heat of steam.

Answer to the second question, relating to horse-power:—James Watt defined a horse-power to be 33,000 lbs raised one foot in one minute, and this standard is still recognised by engineers. Indicated horse-power is ascertained by calculations made from diagrams taken from the top and bottom of the cylinders of the engines when at work. The mean or average pressure on the piston during the stroke is thus ascertained, and this multiplied by the area of the piston in square inches, multiplied by the speed of the piston in feet per minute, and divided by the 33,000, will give the indicated horse-power, or I.H.P.

Yours faithfully,

Puggey.

No. 1. The boiling point of water depends upon pressure, or the temperature at which the ebullition of water begins.

No. 2. The horse used by Watt in his experiments performed 33,000 units of work per minute, and this has continued to be the measure for a horse as applied to an engine.

No. 3. The difference in the working of two engines, the one with lap, the consumption of fuel per mile would be about 28·6 lbs. per mile, and without lap the consumption would be about 36·3 lbs. per mile.

No. 4. The heat of our fires burns clearer in cold weather, when the air is denser and purer, because there is more oxygen in a given space; so with the fire of the body under the same conditions.

No. 5. The loss of blood, whether it be from an artery, a vein, or from the capillaries, is called hæmorrhage.

W. S., King's Cross.

Query 1. Water is not converted into steam at less than 212 degrees.

Query 4. Yes; the heat produced in the fire is due to the union of the oxygen of the air with the carbon and hydrogen contained in the coal. In the human body it is due to the oxydisation of the carbon contained in the food. In both cases the amount of heat produced is the same, but the heat of the fire being more intense.

Query 5. The three kinds of bleeding are—First, arterial, which carries the pure blood from the heart, and flows in jets with great force, and is of a bright red colour; venous, which carries the impure blood back to the heart, it flows slowly, wells out, and is of a dark purple hue; capillary, where there is a general oozing of red blood from the surface. Of all the three kinds, arterial is the most dangerous. Anyone who wishes for information can obtain it in the handbook by Peter Shepherd, published by the St. John's Ambulance Association.

H.

No. 1. Will water be converted into steam at a lower temperature than 212 degrees? Yes. If the pressure above the water be diminished, the vapour is not required of so high a tension to overcome the diminished pressure, and, consequently, the temperature at which the water boils will be lower. In ascending a mountain, the pressure of the atmosphere above us diminishes, and the boiling point is consequently lowered, and on Mont Blanc water is found to boil at 185 degrees. On a height such as this it is impossible to cook food in an open vessel. Although the water boils, the heat is not sufficient to soften the fibres of the meat; but it may be done in a closed vessel, because the pressure inside will be increased by the steam not being permitted to escape. In the boiler of a steam engine, the steam being confined increases the pressure upon the surface of the water, and the temperature of both water and steam is higher than in an open vessel.

Query 4. It does exactly. The carbon of the blood combining with the oxygen of the air inhaled produces carbonic acid gas, which is attended by combustive process similar to that of coals on a fire.

T. B.

◆

QUERIES.

1. Are inside cylinder engines considered better than outside cylinders, and for what reason?

2. Are block-faced slide valves better than those with the recesses cut in the faces?

Answers will oblige,

Yours truly,

READER OF JOURNAL.

SIR,—Will any of your readers inform me of the principle of the injectors action?

Also, if the Roscoe Lubricator works with steam on, and if so, how?

And oblige yours truly,

A FIREMAN.

◆

Society News.

The following branches report an increase of members:—

WOLVERHAMPTON BRANCH.

SIR,—I am happy to report an increase of four new members at our last meeting, which was of an encouraging nature to all concerned.

I remain, yours truly,

BRANCH SECRETARY.

MANCHESTER BRANCH,

March 27th, 1888.

DEAR SIR,—It may no doubt interest your branches to know that we enrolled three new members at our last meeting, and we hope, by steady perseverance, to report additional members at each of our meetings.

I am, yours fraternally,

J. H.

SANDHILLS BRANCH,

March, 1888.

SIR,—I have great pleasure in stating that seven new members have been recently admitted into our branch.

I am, yours respectfully,

SECRETARY.

OXFORD BRANCH,

March, 1888.

DEAR SIR,—Our quarterly meeting was very well attended, and I am pleased to state that we enrolled three new members on that occasion, and I hope that we may be able to report an increase for each issue of our *Journal*.

I am, yours fraternally,

SECRETARY OF OXFORD BRANCH.

PLYMOUTH BRANCH,

March 28th, 1888.

DEAR SIR,—I am pleased to inform you that our last quarterly meeting, held at No. 31, Harwell Street, on Sunday, March

25th, was very well attended, and that five new members were duly enrolled, which makes nine new members admitted into our branch this year, and I have every reason to believe that I shall be able to record the names of other new members after our next meeting.

I remain, yours faithfully,
Sec., Plymouth Branch.

Leeds Branch,
March, 1888.

Dear Sir,—I beg to inform you that at our last meeting, held on March 25th, we enrolled three new members, making ten for the month.

I remain, yours truly,
J. C., Branch Sec.

Newport Branch,
April, 1888.

Sir,—We have made some new members, and have every hope for a good year. The men seem to be waking up to the benefits of the Society, and in that respect I believe the *Journal* will do a vast amount of good. So far they have apparently given great satisfaction.

I remain, yours fraternally,
Sec. of Newport Branch.

The secretaries of Liverpool, Mexborough, and York also report an increase of members.

King's Cross Branch.

The quarterly meeting was held on Sunday, the 8th inst., and was well attended. Correspondence from the general office and other places was read, and met the approval of the members. At 8.30 the meeting was declared open to non-members, viz., enginemen and firemen. The chairman, secretary, and others briefly addressed those present. A presentation of a purse of money was made to Mr. Thomas Patrick, a member of the branch, in recognition of his untiring efforts to promote the welfare of enginemen and firemen. Mr. Patrick replied, and having thanked those who had subscribed to the presentation, gave a brief account of his labours on behalf of his fellow-workmen, dating as far back as 1866, which was attentively listened to. Mr. Patrick resumed his seat amid cheers. The chairman then made an appeal to those who were not members to join our ranks. This appeal resulted in six new members joining. This brought one of the best meetings this branch has held for some time to a close.

Yours fraternally,
F. Green, Sec.

Blackburn Branch,
April 5th, 1888.

Dear Sir,—A meeting of enginemen and firemen was held at the Dolphin Hotel, Blackburn, on Sunday, the 1st April, to hear an address by Mr. T. G. Sunter, of Leeds, General Secretary of the Associated Society of Loco. Engineers and Firemen. There was a fair muster, and a former delegate was voted to the chair, who, after a few preliminary remarks, introduced Mr. Sunter to the meeting Mr. Sunter, who was heartily received, apologised for the absence of Mr. Ball, and in a very comprehensive address appealed to those present to rouse themselves from their lethargy and inertness. The time had arrived when enginemen and firemen should assert themselves, and maintain and fortify their position in the eyes of the world. He pointed out the advantages gained by enginemen and firemen banding themselves together sectionally, both now and in times past, at home and abroad. Contrasting the present time with that of twenty years ago, he delineated the great changes that had been wrought in the railway service, and the vicissitudes encountered by enginemen and firemen. Here Mr. Sunter quite elated his audience. Such sentiments coming from a practical engineman fell with telling effect, and it was manifest that he had struck the right chord, and was grasping both the soul and the man. At the request of the chairman, Mr. Sunter detailed the incidents of the Hexthorpe case, and after an address of one hour's duration, forcibly appealed to those joining the society to become their own agents in extending its ramifications, and building up an impregnable bulwark against encroachments upon their rights and liberties, and at the same time adopting a conciliatory policy towards their employers. (Applause.) An engineer, in moving a vote of thanks to Mr. Sunter, said he was convinced that all present felt highly gratified at the able and dispassionate address they had just heard. (Hear, hear.) He complimented the meeting on having the Chief Secretary himself amongst them that night. He hoped those sentiments they had heard from a *knight of the footplate* had descended deeply into the minds of his brother engineers. He thought that not only the society, but the loco. men throughout the kingdom, by gaining the services of Mr. Sunter, had gained a good acquisition. (Applause.) The treasurer of the old club, in a brief speech, seconded, and the vote being carried, officers were then elected, and afterwards 30 paid their admission fees and enrolled themselves. "Still there's more to follow," as the books had to be abruptly closed owing to the limit of time. I am glad that the "one thing needful" is now within the reach of all, and that the enginemen and firemen are banding themselves together throughout the country in love and unity, and "choosing the good part, which shall not be taken away from them."

I am, yours fraternally,

J. B.

STRATFORD BRANCH,

LONDON, *April*, 1888.

SIR,—A mass meeting of enginemen and firemen was held at the Railway Tavern, Stratford, on Sunday, March 25th, 1888, under the auspices of the Associated Society of Locomotive Engineers and Firemen. Mr. T. Ball, organising secretary of the Society, attended the meeting, and Mr. C. E. Stretton, C.E., and consulting engineer to the Society, occupied the chair. The room was well filled, something like 250 persons being present, including representatives from the Kentish Town, King's Cross, Paddington, Bow, and Battersea branches. The Chairman, in a most interesting and instructive address, alluded to his resignation as vice-president and consulting engineer to the A.S.R.S., and gave it as his opinion that the whole of the unpleasantness had been caused by two or three individuals, and that he believed he had the sympathy of the great body of railway servants, in whose interests he had so long and faithfully laboured. He then gave scientific proof that the opinions of some persons were mere fallacies so far as the attainable speed of the locomotive was concerned. He also dwelt at considerable length upon the Hexthorpe accident, and who were the real workers in the trial, the credit of which he claimed for the Society to which he was now allied. The worthy chairman made use of several diagrams during his address, which was listened to with great interest by all present. He then called upon the Organising Secretary to address the meeting. Mr. Ball, in his opening remarks, alluded to the correspondence in the *Railway Herald*, and gave it as his opinion that Mr. Stretton had been treated in a very ungrateful manner by the A.S.R.S., and especially when the time and talent he had so ungrudgingly given in the interests of its members were taken into consideration, and that if similar treatment was to be the reward that all gentlemen might expect to receive after years of faithful service in connection with trades' unions, they would soon hear the last of them interesting themselves in the welfare of working men. He then dealt with the objects and benefits of the Society, and exhorted those present who had not yet become members to do so at once. The following resolutions were then unanimously adopted :—"1. That this meeting fully supports the objects of the Society in doing its utmost to provide for the safety of railway working, especially as relates to the introduction of the absolute block system, continuous automatic brakes, and the other necessary improvements as required by the Board of Trade. 2. That this meeting of enginemen and firemen having heard the objects and advantages of the Engineers' Society, heartily approves of the same, and pledges itself to do all in its power to further its objects, and calls on those present to join its ranks. 3. That the best thanks of this meeting be given to Mr. Clement E. Stretton, C.E., for his attendance and interesting lecture; also that the members have the greatest confidence and respect for Mr. Stretton, and deeply regret that any body of railway servants should have so far forgotten themselves as to have treated him in the 'unhandsome' manner recorded in *The Railway Herald.*" Mr. Ball then called upon those who were desirous of becoming members to give in their names to the secretary, and in response I was for some considerable time engaged in recording the names of new members. The usual votes of thanks having been given, one of the largest and most successful meetings of enginemen and firemen ever held in Stratford was brought to a close, fifty enginemen and firemen having given in their names for membership.

I remain, yours faithfully,

Secretary of Stratford Branch.

GOOD FRIDAY DINNERS.

We have received intimations from Bristol and Newport that the enginemen and firemen at those stations are quite encouraged with the manner in which their Good Friday gatherings terminated, the most perfect good feeling reigning throughout the proceedings, and that hopes are entertained of increased membership being the outcome of these social gatherings. The numbers catered for were 105 at Bristol, and 90 at Newport.

Reading Branch,
April 2nd, 1888.

Sir,—In concurring with the remarks made by the King's Cross secretary in the March issue of this *Journal*, with respect to the work done by the organising secretary, I wish to say that although every possible effort had been made by members to open a branch of the Society in this place, I consider it doubtful whether such a branch would ever have existed had he not paid us a visit. At the same time, I should like to make a suggestion, which, if approved of by tne E.C. and Gen. Sec., I believe, would be attended by good results; that is, that he should visit the branches periodically, at least some of the smaller ones. I think this would be an inducement to many enginemen and firemen to attend the meetings, and would probably be the means of adding a number of members to the Society. Hoping to learn the views of other members on this point in future numbers,

I remain, yours fraternally,

F. Randall,
Sec., Reading Branch.

* * *

BRANCH MEETING HOUSES.

Pontypool.
Hanbury Hotel, Griffiths Town, Newport, Mon.

Leeds.
Prince of Wales Hotel, Mill Hill. Last Monday in month.

Liverpool.
American Tavern, Byrles Street, off Park Road, Toxteth Park. Held fortnightly.

Bradford.
Granby Hotel, Union Street. First Sunday in month.

Llanelly.
Neptune Hotel, New Dock, Llanelly.

Sandhills.
Brown Cow, Walton on the Hill. Alternate Sundays.

Exeter.
New Market Inn, Goldsmith Street, Exeter.

NOTTINGHAM.
Mission Room, Queen's Walk, Nottingham. Every Monday at 8 p.m.

BRISTOL.
Phœnix Hotel, Totterdown. Every fourth Sunday at 7 p.m.

PLYMOUTH.
At Mr. Sleeman's, 31, Hortwell Street. Last Sunday in Quarter at 6.30 p.m.

YORK.
Adelphi Hotel, Railway Street, York. Alternate Sundays at 8 p.m.

PADDINGTON.
Builders' Arms, Westbourne Park, London. Every third Sunday.

OPENSHAW.
Drovers' Arms, Ashton Road, Openshaw. Alternate Sundays at 7.30 p.m.

KING'S CROSS.
The City of London, York Road, Cattle Market, London. Monthly; next meeting May 6th.

BATTERSEA.
The Two Brothers, New Road, Battersea. Next meeting, Tuesday, April 24th.

RETFORD.
Oddfellows' Arms, London Road, South Retford. Monthly at 8 p.m.

LINCOLN.
Arcade Coffee Tavern, Lincoln. Last Sunday in the month.

STRATFORD.
Railway Inn, Angel Place, Stratford, London.

WOLVERHAMPTON.
Gladstone Inn, North Road, Wolverhampton. Meetings held monthly.

GRIMSBY.
Friendly Society Hall, Lower Spring Street. Alternate Sundays at 10 a.m.

BIRKENHEAD.
Borough Hotel, Birkenhead. Alternate Sundays.

READING.
Blagrave Arms, Blagrave Road, Reading. Meetings fortnightly.

BLACKBURN.
Dolphin Hotel, Blackburn.

Branch Secretaries are requested to forward us the names of their meeting houses.

HONORARY MEMBERS ADMITTED IN 1888.

MESSRS. TIPPETTS & SONS, Solicitors,
Maiden Lane, London, E.C.

MR. A. MAXWELL,
Duke of Clarence,
St. Pancras Road, London.

MR. L. BEAUMONT,
Adelphi Hotel, Railway St., York.

THOMAS LOUGH, ESQ.,
5, Newton Grove,
Bedford Park, Chiswick.

MR. F. WARD,
King's Cross, London.

MR. G. F. BROACH,
City of London,
York Road, London.

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LIST OF BRANCHES.

We have now branches at the following places:—

Sheffield
Neath
Plymouth
Exeter
Oxford
Leeds
Cardiff
Battersea
Bow
Lincoln
Wolverh'ton
Skipton
Retford
Birkenhead
Carnforth
York
Llanelly
Mexborough
Nottingham
Reading
Newport
Kentish Town
Paddington
Pontypool
Toton
Sandhills
Manchester
Swansea
Liverpool
Bristol
Grimsby
Gloucester
Birmingham
King's Cross
Stratford
Peterboro'
Bradford
Openshaw
Stockport
Blackburn

Obituary.

We regret having to record the death of Brother Robert Foster Chapman, of the Leeds Branch, who departed this life on Sunday, April 8th, 1888, aged 33 years. He was formerly an engine-driver in the service of the Midland Railway Company.

LOCOMOTIVE ENGINEERS AND FIREMEN'S

Monthly Journal.

"*This that they call Organization of Labour is the universal vital problem of the world. It is the problem of the whole future for all who will in future pretend to govern men.*"—THOMAS CARLYLE.

"*I know no better definition of the rights of man:—Thou shalt not steal; Thou shalt not be stolen from; what a society were that*—PLATO'S REPUBLIC, MORE'S UTOPIA, *were emblems of it! Give every man what is his—the accurate price of what he has done and been—no more shall any complain, neither shall the earth suffer any more.*"—THOMAS CARLYLE.

VOL. 1. MAY, 1888. NO. 4.

MAY DAY IN THE OLDEN TIME.

THE advent of May Day, which from the earliest historic times has been welcomed and celebrated by rejoicing and holiday as the harbinger of the approach of the sun northward, brings to mind many interesting associations of bygone days. The invariable accompaniment of morrice-dancers, among which were characters representing Robin Hood, Little John, Friar Tuck, Maid Marian, and others, tend to enhance its interest in the eyes of local readers.

It is a matter of conjecture why these celebrities and their valiant deeds should have been commemorated on this particular date, but not improbably it was because these worthies are supposed to have returned to the woods on this day after wintering *incognito* in the villages.

Hall, the historian, has preserved a curious account of a "Maying" and an episode of Henry VIII., at London, on May Day, 1516, as follows:—"The Kyng and Quene, accompanied with many lordes and ladies, roade to the high grounde on Shooters-hil to take the open ayre, and as they passed by the way they espied a company of tall yeman, clothed all in grene, with grene hods, and bowes and arrowes, to the number of II. C. (200). Then one of them whiche called hymselfe Robyn Hode, came to the Kyng, desyring hym to se his men shote, and the Kyng was content. Then he whisteled and all the II. C. archers shot and losed at once, then he whisteled agayn, and they lykewise shot agayne: thier arrowes whisteled by crafte of the head, so that the noyse was straunge and great, and muche pleased the Kyng, the Quene, and all the company. All these archyrs were of the Kyng's guard, and had thus appareled themselves to make solace to the Kyng."

The connection of Robin Hood with the May games continued but till the first quarter of the seventeenth century. It flourished in Warner's time, and this writer. in 1602, says:—

"At Paske (Easter) began our morris, and ere
Pentecost our May,
Tho' Roben Hood, litell John, frier Tuck, and
Marian deftly play,
And lord and ladie gang till kirk with lads and
lasses gay."

It is curious that these customs flourished more vigorously in Scotland than elsewhere.

These celebrations in the towns often became of a very riotous nature, and year after year the magistrates of Edinburgh were obliged to exert their authority in repressing them—often ineffectually. In the year 1561, on May Day, the mob were so enraged at being disappointed in "making a Robin Hood," that they rose in mutiny, seized on the city gates, committed robberies upon strangers; and one of the ringleaders, being condemned by the magistrates to be hanged, the mob forced open the gaol, set at liberty the criminal and all the prisoners, and broke in pieces the gibbet erected at the cross for executing the malefactor. They next assaulted the magistrates who were sitting in the council-chamber, and who fled to the toll-booth for shelter, where the mob attacked them, battering the doors, and pouring stones through the windows. There they were kept in confinement until they consented to publish a proclamation, offering indemnity to the rioters upon laying down their arms. Yet as late as 1592 we find the upper class complaining of the profanation of the Sabbath, "by making of Robin Hood's plays."

These celebrations contrast strangely with the quietness of the village festival, which generally took place on the green around the Maypole, which latter is one of the most pleasant associations of May Day. Maypoles still remain in many of the agricultural villages of England, and we all know that the church of St. Andrew Undershaft, London, received its surname from the Maypole which formerly stood before it.

Early writers tell us that it was the custom in former times for the youth of both sexes in every village to sally forth at sunrise to choose the tallest and straightest tree they could find in any adjoining wood. This was cut down, and by their united efforts brought home to the village, where it was erected on the green and decorated with branches and flowers, "amid great rejoicing." It was there allowed to stand, we are informed, the whole of the following year.

Though this may have been the rule elsewhere, we have proof that the maypoles of the rural villages of this county were religously cared for and preserved—not for a single year, but as long as they would stand, and it was with reluctance that new poles were brought when absolutely necessary to supersede the old ones. In some cases, even when blown down, they were retained, after reparation at the hands of the local blacksmith. We have an instance of this in the maypole remaining at Linby, Notts. This consists of a straight pole about forty feet in height, the juncture being about half-way up, where the parts are secured by an iron clamp of unwieldly proportions. Remains of the gay colours with which it was formerly decorated are plainly visible.—*Nottingham Express.*

Scientific.

SINGLE v. COUPLED LOCOMOTIVES.

For many years by far the larger proportion of passenger engines have been made with four coupled driving wheels. Latterly, however, a tendency to change has been manifest, and locomotive engineers are reverting to single driving wheels. There is a reason for the change, or, to speak more accurately, several reasons; one is no doubt simply a desire to produce something new. A locomotive superintendent, after designing some hundreds of engines more or less closely resembling each other, determines that he will break new ground and turn out a different type. But although this cause no doubt does operate, it only operates to a limited extent; railway engineers are too shrewd to build a new class of engine simply because it is new. There are, indeed, no lack of far more powerful and efficient reasons for abandoning the coupled engine. One of these is that the single engine, other things being equal, costs less money, runs more freely, uses less coal, and is much easier to design than a coupled engine. As regards the second and third of the advantages named above, we are free to confess that great disparity of opinion has been manifested. Many competent authorities assert that the internal resistance of a coupled engine is not greater than that of a single engine. They base their opinion on modern practice, whereas those who hold different views have in mind older practice. At one time coupling rods were always fitted with straps and cottars, or their equivalent. The brasses were adjustable, and the coupling rods were always a good if not a tight fit on the pins. There was thus imparted to the whole engine, regarded as a vehicle, an objectionable stiffness. The adjustable coupling rod has, however, long since passed away, and bushed ends and slack fits on the pins have taken its place, with the result that the engine runs much more freely. To the bushed end, indeed, the survival of the coupled express engine is largely due. Perhaps the most potent of all the causes which have once more brought the single engine into favour is the use of steel rails, which permit heavy loads to be put on the driving-wheels. It is an axiom with English locomotive superintendents that the adhesion of a driving-wheel is equivalent to one-sixth of the insistent weight pressing on the rail. This assumes of course that the rail is dry and clean. Taking this as a basis, it is easy to see how far it is possible, under given conditions, to dispense with coupling. Let us take the case of an engine with a 7ft. wheel, a 17in. piston, and 24in. stroke. The tractive effort of such an engine would be 83lb. per pound of effective pressure in the cylinder; we may take this at 100lb. when the engine is starting away with a train. Then the gross tractive force will be 8,300lb., and the load on the driving-wheels must be six times as much, or about 22 tons. This is more than can be put on one pair of drivers; therefore, four are used, with a load of 11 tons on each; and the total weight of such an engine would be probably 36 tons. Obviously if the cylinders were larger the case would be so much worse. When, however, this engine was running at speed the average pressure would not exceed 50lb. on the square inch of piston, and a load of 11 tons would suffice for this; so that, in point of fact, coupling would then be unnecessary, and no stress would pass through the coupling rods from the leading to the driving trailing wheels. Acting on this assumption, locomotive superintendents have, so to speak, split the difference. They have to put a little extra weight on a single pair of drivers, and resorted to the use of sand to run up the co-efficient of adhesion. Take, for example, Mr. Stirling's celebrated Great Northern engines, with 18in. cylinders, 28in. stroke, and 8ft. wheels. The tractive effort of these engines is 94lb. per pound of effective cylinder pressure, or for 100lb., 9 300lb., demanding a driving-wheel load of about 25 tons. The actual load carried is between 18 and 19 tons, corresponding to a co-efficient of adhesion of about one-fourth instead of one-sixth. The difference is made up by the use of sand when the trains are being started, and the great success which has attended the career of these engines fully justifies their adoption.

While most engineers admit that coupling is quite unnecessary while rails are clean, many argue that it is essential in the British climate, because the rails get dirty; and if trains are to keep time we must be prepared not for the best, but for the worst. It is answered to this that coupling does not get over the whole difficulty. A coupled engine will slip almost as badly as a single engine on a really dirty greasy rail. Coupled engines have to be helped with sand, and when sanding once begins, a pair of drivers is as good as two pairs. This is perhaps going too far, but there is force in the argument. There is another factor, however, which must not be overlooked; that is the work done by the engine. If a great tractive effort is necessary, either because the trains are very heavy or the gradients steep, then coupling is advisable. No one, for instance, to take an extreme case, would suggest that a goods engine should not be coupled. We are, however, not considering any engines but those employed in drawing passenger trains at the highest speeds, and we believe that for such engines it is far better to use sand than coupling rods. The use of sand is now much better understood than it was, and the system of blowing a little under the tread of the wheels with an air or steam jet promises to work wonders.

It is fortunate that ample data exist to enable the locomotive superintendent to decide whether he will build single or coupled engines. The result of daily working goes to show that for certain classes of traffic the single engine leaves nothing to be desired. We have already referred to the Great Northern, but there are plenty of other examples. Thus, we have Mr. Stroudley's Imberhorne class, with 6 ft. 6 in. single wheels; Mr. Sacre's, with 7 ft. 6 in. wheels; Mr. Dean's, 7 ft. 8 in. wheels; Mr. Drummond's, 7 ft. 2 in.; and the new Midland single engine. On the London and North-Western Railway single engines have been extensively used for years, always with success. The great point to be borne in mind is that the wheels must not be too small, or the cylinders too big; a 6 ft. 6 in. driver, and a 17 in. cylinder mark the maximum limit. An engine with 17 in. cylinders and 6 ft. wheels must be coupled, if it is to perform satisfactorily; but, as a rule, express work is never done with 6 ft. wheels. On the London and North-Western, Mr. Webb tried express engines with 5 ft. 6 in. wheels, but the results were not satisfactory. The wear and tear is very heavy. Such engines have attained a speed of 70 miles an hour down a bank; this means 354 revolutions per minute for the driving-wheels; so that it is not unreasonable to assume that the wear and tear is considerable. The tendency in the present day is to run at higher and higher speeds; but it is certain that the limit has been reached in this direction, and that something very novel in railways will be needed if any marked advance is made. There is no reason, however, to think that the limit has been nearly reached in the weight of trains, and engines of augmented power are built to haul these trains at maximum speeds. The power of an engine is, however, mainly determined by the size of the grate; and it is a very difficult thing to get in a grate of sufficient size while the engine is coupled behind. It is true that Mr. Stroudley has shown that an engine may be coupled before, but his example has not been followed; and taking things as we find them, the difficulty exists. It is not safe to use a coupling-rod more than 9 ft. long, and with an inside cylinder engine this means 7 ft. as the maximum length of grate, and an area of less than 20 square feet. When the trailing wheel is small the grate can be carried over the axle, but when it is large the practice entails well-known disadvantages and troubles. With single drivers a grate of almost any dimensions may be used, and this is perhaps one of the reasons why such engines are now in favour; but the principal reason is, no doubt, that steel rails and tyres, and the sand blast render it possible to get all the adhesion really needed without resorting to coupling.—*Engineer.*

* * *

PHYSIOLOGICAL FACTS BRIEFLY REVIEWED.

Absorption is carried on by the process of exosmosis and endosmosis. It depends upon the capillaries and lymphatics.

We have two kinds of absorption—extrinsic and intrinsic.

The skin, lungs, and alimentary canal are the organs concerned in absorption.

The lacteals are the lymphatics of the small intestines. They absorb all nutritive matters, and especially fatty matters.

The capillaries absorb glucose and albuminoids most especially.

Capillarity is generally regarded as attraction against gravity.

The richer the fluid in albuminoids, the higher it mounts by capillary attraction.

The more defusible the liquids the more readily they are absorbed.

Blood deprived of its red blood corpuscles is regarded as lymph.

Nutrition is the vital power by which a substance maintains itself. It is a process of assimilation and disassimilation.

Assimilation is a process of endosmosis, disassimilation is a process of exosmosis.

In growth there is an excess of assimilation over disassimilation.

Febrin is said to be composed of globules of the coloured corpuscles of the blood.

Fat, sugar, starch, &c.. are ultimately converted into carbonic acid and water.

Urea represents the waste of the tissues and not the waste of the products of oxidation.

The lower the development and the younger the tissue, the more readily it is reproduced.

Epithelial tissue most easily reproduced. Next in order osseous and fibrous.

Muscular, nervous, and the compound tissues are most difficult of reproduction on account of their adhesiveness.

The phenomenon of death is brought about by the want of nutritive blood and the inability of the tissues to appropriate it when present.

Asthesia, or cessation of the heart's action; anæmia, or want of nutritive blood; asphyxia, or cessation of the functions of the lungs; and coma, or that condition wherein the brain is affected, are the different modes of death.

Nutrition demonstrates constant chemical transformation.

Heat is a molecular motion transmitting a similar motion to neighbouring objects, and is the cause of all vital force and phenomena.

When a solid is heated, it expands, liquefies, and then evaporises—the atoms being drawn further and further apart.

Enough heat to raise 1 lb. of water 1 deg. Fahr., is understood to be the unit of heat.

The sources of heat are the sun, mechanical, chemical, and the clasping together of atoms.

Heat is communicated because all forces seek their equilibrium. It is communicated by radiation, contraction, and convexion.

Radiant heat is transmitted, absorbed, and reflected.

The best absorbers of heat are the worst reflectors, and *vice versa*.

The metals are the best conductors.

Absolute contact is necessary for conduction.

Heat is lost by radiation, conduction, and evaporation.

When a solid is transformed into a liquid, or a liquid into a gas, a large amount of heat is absorbed from the surrounding object.

Animal heat is generated in the body chiefly by the oxidation of carbon and hydrogen.

Hydrogen produces more heat than carbon.

The more vascular an organ, the more heat evolved.

The heat of the body is chiefly regulated by the skin through the perspiration, and the perspiration by the vaso-motor nerves.

The greater the functional activity the greater amount of heat produced.

A warm-blooded animal is one of constant temperature, while a cold-blooded animal is of variable temperature—depending upon the surrounding temperature.

Birds have the greatest temperature, ranging from 105 degs. Fahr., to 110 degs. Fahr.

In a state of hibernation the animal lives chiefly upon oxygen and his own fat, Respiration, temperature, and all the functions of life are greatly reduced.

In cholera the temperature may fall as low as 80 degs. Fahr., and in tetanus it may rise as high as 111 degs. Fahr.

113 degs. Fahr. would prove fatal on account of the disturbance of the nutritive process. 75 degs. Fahr. would prove fatal on account of the excessive diminution of heat.

Heat coagulates the blood and the myocin of the muscles.

In disease, if the temperature does not range over 101 degs. Fahr. the attack is mild. 102 degs. Fahr. to 103 degs. Fahr. severe ; 105 degs. Fahr. to 108 degs. Fahr. very severe, if not fatal.

98 degs. Fahr. is about the normal temperature.

The rise of temperature after death is due to conduction.—*Family Doctor.*

FOUR-CYLINDER ENGINE.

A locomotive designed by F. W. Johnstone, superintendent of motive power of the Mexican Central, for hauling trains over mountain grades, is something quite new. It is illustrated in the *National Car Builder*, from whose description we extract the following details : —

It is a new departure in locomotive design, the weight of the tender being utilized for the purpose of giving adhesion to driving-wheels placed under it. An ordinary four-wheel truck is placed under the smoke-box, and another under the deck, these secondary trucks being pivoted in the ordinary way, but the centre-pin, instead of being attached to a rigid frame is attached to the driving-wheel truck frame, which is itself pivoted at a centre bearing. Both engine and tender are carried upon the same rigid frame, but a marked peculiarity and divergence from previous methods is, that while the cylinders are attached to the main frame, the group of wheels to which they impart motion are carried by a separate and swiveling frame, so that on curved portions of track the longitudinal axes of the cylinders and the truck frames are parallel. In order to allow for the angle between the plane of motion of the crank-pin and the longitudinal axis of the piston-rod, consequent upon the arrangement, the strap ends of the forward ends of the main connecting and tension rods are pivotly connected to the brasses, so as to allow of a horizontal vibration, while at the same time the brasses may be filed or keyed up without affecting this movement of the rods. An arrangement of a similar character is applied to the eccentric rods for the same purpose.

The piston-rod cross heads are not connected directly to the crank-pins by connecting rods, but act through an intermediary system of levers, which not only allows of the swiveling of the truck frames without interfering with the transmission of power, but also permits a crank pin stroke greater than that of the pistons, and, consequently, a reduced piston speed relatively to a given speed of the driving wheels. The cross heads carry pivoted to them vertical rocking levers, to the lower extremities of which are attached connecting rods leading to the crank-pins of the centre pair of wheels which they drive. The upper extremities are connected with the corresponding extremities of similar levers of equal size oscillating on journals in boxes attached to the main frame, and placed but a short distance from the cross-head levers, with the centres on the same horizontal axis as these. To the lower extremities of these secondary levers are attached tension rods, which at their other ends are fastened to pins on the truck frame, so that as the points of attachment to the truck frame move back or forward as the truck frame swivels on the curves, the forward end of the main connecting rod is moved to a corresponding extent by means of the cross-head lever.

The driving-wheels under the tender are driven in a similar way, the power being transmitted from cylinders bolted to a casting which forms the foot-plate.

The boiler is of the ordinary straight type, but the firebox, being between the two truck frames, is not restricted in width. In regard to this form of engine, Mr. Johnstone writes us:—"I am now making drawings of an engine embodying these principles, but with only two cylinders and six wheels connected, and four-wheel trucks under the tank. I wish to try and introduce this lighter engine for freight and heavy passenger service, as it is more generally adapted for all roads having heavy traffic than the larger engine. The main object obtained in this design is a very large firebox, which is suspended without overhanging. The firebox of the engine I am now designing will be six feet long and eight feet wide, cylinders 22 × 18 inches, which is equal to 19 × 24 inches. With so large a firebox very large nozzles can be used, and no netting will be necessary."

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THE SLIDE VALVE.

A slide valve has no lap when the arch will just span the exhaust port and bridges, and the faces just equal the ports in width.

Lead is the amount of opening which a valve has when the engine is on the centre.

When a slide valve has neither lap nor lead the eccentric is set at an angle of

90° with the crank on the side toward which the engine is to run. Moving the eccentric forward makes the action of the valve earlier with reference to the crank in all its points.

Moving the eccentric backwards makes the action of the valve later with reference to the crank in all its points.

When the blade of the valve exceeds the ports in width the amount which it projects over the edges of the port when in its central position is termed lap. The projection over the outside edge of the port, *i.e.*, the edge at which the opening for admission takes place, is called the outside or stem lap; the lap on the inside or arch side of the blade is called the inside or exhaust lap.

When outside lap is added, the eccentric must be set enough farther ahead of the crank to take the lap up, *i.e.*, so that the valve may be all ready to open when the engine is upon the centre. Usually a little lead is also given in order that the steam may get in on time and the port be opening as the piston advances. The effect of stem lap is to close the valve earlier and allow the steam to expand. The effect of inside lap is to close the exhaust earlier and introduce compression.

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PROTECTION FOR LUNGS.

Mr. James Hess makes a very sensible suggestion when he calls attention to the absurdity of our present curious habit of wearing cambric-back vests, while the fronts are of heavy material and sometimes wadded, and urges the propriety of protection for both sides of the lungs. The habit, of course, has grown from a belief that the outer coat is sufficient protection for the back, while the chest needs warmer covering, on account of the coat being open. But it seems a disproval of the reasoning that the first unpleasant sensations of chilliness are the so-called "creepers" running down the spine. Even when the warmest woollen material is selected for a suiting, the tailor, unless otherwise ordered, will invariably make the back of the vest of some thin flimsy material, like cambric or silk, though he may deem it advisable to pad the front with cotton wadding. There is no proper reason why the back of the vest should be made so insufficient. The front may be made uncomfortably thick, and still fail to protect the lungs unless the back is made equally thick and warm. In front they are protected about five times as much as in the back by clothing, ribs, flesh. muscles, and fat. In the back the lungs come almost to the surface, and therefore need more protection.

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HEAT AND LIGHT.

All the actions of combustion which heat can produce may be also produced by light, but the converse does not hold good. There are many reactions which light alone seems able to set up. All these reactions may be summed up as a disturbance of the primitive molecule which is decomposed into simpler elements. These elements are few in number; they are, if we limit ourselves to volatile bodies, formic, acetic, and butyric acids, methylic and ethylic alcohols, and ethylic aldehyd. These staple groups are generally found the same with one and the same body, whatover the source from which it derives its oxygen. But this is not always the case. Thus lactic acid, if burnt by means of atmospheric oxygen, yields acetic acid, but produces butyric acid if it obtains its oxygen from the salts of mercury. These stable residues of combustion do not pre-exist as groups in the original molecule, but result from a new arrangement of the molecules during combustion. This is proved by the fact that they are found identical in bodies of different types, and are not always the same with one and the same body. These products contain a smaller number of molecules of hydrogen and carbon than the bodies whence they are derived. The sole exceptions to this rule, the formation of formic acid at the expense of oxalic acid, and that of butyric acid from lactic acid, disappear if we double the formulæ of oxalic and lactic acids. Potassium permanganate, which often acts in the cold and in darkness, does not yield other products than those resulting from the action of the sun and of heat. The bodies which it attacks best are those which are found least stable under other oxidizing conditions. But if it does not occasion any novel facts, we may study with it very conveniently the circumstances of the experiment and the conditions of initial and final acidity or alkalinity which determine the result. These last conditions play a great part in the combustions made at the expense of oxygen, free or combined.

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COMBUSTION.

Combustion is frequently confused in the minds of the uninitiated with the idea that it must be and mean the union of air with a fuel, and that it is the latter which burns. It is, indeed, a union, but one in which the oxygen of the air as readily seizes upon the elements of the fuel as the reverse. If we stand at the peep-hole of a furnace where a stream of air is admitted through the sides of the brick-work over the top of the fire, and into an atmosphere composed of the carbonaceous gases arising from the fuel, it will be seen to give out a flame, just as the gas flowing from a jet burns with a flame as it issues into the atmosphere. Regarding the matter in the usual light, namely, that the smaller element of combustion is to be considered as the one burning, or the fuel, we find that a current of oxygen pouring into an atmosphere of carbureted or bi-carbureted hydrogen would burn in precisely the same way as these gases would burn if issuing into the atmosphere. Therefore, either may be considered as the supporter of the combustion of the other, though oxygen, from its universal use, is usually considered in that light.

It is also erroneously considered that these combustible gases possess the innate elements of combustion regardless of other circumstances. That this is not the case is evidenced by the fact that a lighted candle plunged into a jar of bi-carbureted hydrogen that is carefully protected from the atmosphere, will be instantly extinguished. These are a few facts that must be borne in mind by the engineer in the adjustment of his air supply over the furnace fire.

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CARE OF THE THROAT.

Much trouble and annoyance, to say nothing of the actual throat ailments, during the winter months, may be avoided by forethought in that direction.

The question for consideration is, Shall we muffle the throat during the winter? The answer is: Except on rare severe days, or unless suffering from illness, no. Of course if one has already begun to wear a muffler or a scarf, then, in all probability, it will have to be continued during the winter.

The experience of one who has tried both ways is here given as an illustration of the truth which we advocate. The writer of this article personally knew of a young man who was always in the habit of wearing a woollen scarf around his neck during the winter. Commencing early in the fall, it was continued till the cold spring days had passed. This individual rarely went through a winter without one or two colds, and frequently a sore throat lasting several days. In addition to this the throat was always tender and easily affected by the wind.

Several years ago he discarded the scarf entirely. During the first winter of going without a scarf, he had but one cold, and that not a severe one, and in the spring his throat was much stronger than any winter before. Subsequently he never wore a scarf during the winter, and only during a storm or on a severe winter day did he even turn up his over-coat collar.

A little more care in keeping the feet dry and warm, and less attention in muffling the throat during the winter, would, in most cases, secure better health and a less number of colds. If we study the manner of dress of those whose employment takes them out in all weathers, we shall see that as a rule the milk-man, butcher, postman, and many others do not habitually wrap up their throats while on their rounds. Wearing a scarf during the winter has a tendency to make the throat tender, and if it happens to be forgotten, or a mild day tempts you to go without it, such exposure is almost sure to be followed by a cold or sore throat.

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THE SCIENCE OF BEDROOM FIRES.

Science says that the air in unwarmed bedrooms is not *fresh;* that it can never be half so fresh and pure as when a good fire is kept. This is very easy of explanation. When a fire is burning in the grate the fire itself uses up a considerable quantity of atmospheric air in the act of burning. Not only so, but the chimney becomes a hot shaft, carrying up, as draught, a large quantity of air. Where does the air come from which is used in burning, or passes up the chimney? It can only come from inside the room. As rapidly as the air passes up the chimney, so rapidly is a vacant space made in the room, and so rapidly also does the air outside the house rush in by every chink and cranny and opening, and even through the walls, to fill up the vacant space. For it must be remembered that the atmosphere is always pressing on every house and window, and at every possible opening, with a pressure of fifteen pounds to the square inch. The fireless bedroom may be compared to a castle in the hands of an enemy, the cold, *stagnant* air being the enemy. At the windows and other openings peeps in a friend in the shape of cold *fresh* air. But so long as the air inside is of the same temperature as that outside its pressure is also the same, and so the inside air holds the castle. Now, let the maid enter and light a brisk fire, and immediately some of the air of the room is used up for combustion, more passes up the chimney in the current, and all the rest is well warmed, and its power of resistance to the outer air is diminished in exact proportion to its increased warmth. So that a fire rapidly clears the room of an enemy in the shape of cold, stagnant air, and brings in a friend in the shape of fresh air, which is soon warmed. That is the teaching of simple, demonstrable science. —*The Hospital.*

Miscellaneous.

WHAT MIGHT HAVE BEEN.

We are all in the habit of sometimes looking back, and wondering "what might have been." Most often, perhaps, the retrospect brings us no pleasure; sometimes, it may cause us poignant regret. We see very clearly that if we had done such a thing at such a time, our whole future would have been different. But we did not do it, and we missed the flood which would have led us on to fortune. On the other hand, it may happen that had we not done such a thing at a particular time, great disaster would have befallen us, and perhaps the whole course of our life would have been blighted. When the retrospect is such as this, then our hearts may well be filled with gratitude at the thought of what might have been, but which happily was not.

It is strange how many "might have beens" there are in every life. Let us take one instance only—that of marriage. Marriage, it is said, is a lottery. It is so in a different sense to that in which it is usually understood. It would be an interesting experiment to take any fifty married people at random, and learn from them how they first met their future wife or husband. In forty-nine cases, perhaps in the whole fifty, it would be found that it was by mere accident. Had not he or she gone to such a party, or been riding in such a compartment of such a railway carriage at such a time, or been visiting at such a friend's, or doing one or other of ten thousand things which they might just as probably not have been doing, he would not have met the lady, she would not have met the gentleman, who were to occupy such important relationships to them in the future. Let any husband and wife refer back to the time of their first meeting, or to the occasion to which they attribute the springing up of their mutual love, and they will find that their both being brought together at that time, and under those circumstances, might have been prevented by a hundred of the most trifling causes on each side. Had any one of these causes, each of which was equally likely to take effect with that which led them to the place where they were to meet their fate, prevailed, *he* would have married some other womnn, *she* would have married some other man ; or it may be that one or both would never have married at all. This is only one illustration of what might have been in individual life.

But the same thing prevails to an even more striking degree in the life of nations, in the life of the whole civilised world. Suppose Julius Cæsar, when he landed on the coast of Kent, had been struck down by a javelin thrown by a naked savage. Then he could not have destroyed the last vestiges of the Roman Republic, the long line of Emperors would not have been and the current of the world's history would have been changed. The position of every one of us to-day would have been different if that javelin had struck the man who was destined, when he had done his ambitious work, to fall pierced with wounds at the base of Pompey's statue.

The same thought of "what might have been" suggests itself in the life of Napoleon. If a bullet from an Austrian musket had struck the "Little Corporal" as he was fighting in the marshes of Arcola, or forcing his way over the bridge of Lodi, there would have been no French Empire, no Retreat from Russia, no battle of Waterloo. England would have saved a thousand millions of money, and we should to-day be paying twenty-eight millions less of taxation every year. As it was, Napoleon went through twenty-five years of war without a scratch, and when he himself thought of "what might have been" on a thousand fields, he might well be justified in styling himself the Man of Destiny. All history, as well as every life, is crowded with striking instances of similar examples.

TOO MUCH CIVILITY.

"I have often," said Montaigne, "seen men uncivil by too much civility, and troublesome by courtesy." The witty French philosopher never said a truer thing. Excess of any virtue is vice, and excess of politeness is by no means a rare mode of ill-breeding. Of the two, it would be difficult to say whether positively boorish rudeness or importunate courtesy is the more undesirable. Rudeness we may resent by socially boycotting the boor, but we cannot well quarrel with one who is excessively polite. We can only "grin and bear it," as the saying vulgarly, but forcibly, puts it.

Every one has been the victim at some time or other of the person who smirks and smiles and bows and scrapes while he or she is overwhelming us with a flood of rapid compliments, which make us bite our lips with impatience, while we are compelled to simper back as if we liked it. Then there is the host or hostess who will insist upon pressing upon us what we do not require, if they should happen to notice that we are making a sparing meal at their table. They will not allow us to be judges of what is best for ourselves. They feel it incumbent upon them to see that we do full justice, according to their idea, to the good things they have provided. "Love me, love my dinner," seems to be their maxim. A very common form of importunate politeness is the indulgence by our host or hostess in profuse apologies for their not having received us better. They have really given us an excellent dinner, but with deprecating smiles they will affirm that "Our cook is so exasperating! we really must apologise!" or "It is our usual ill-luck. Our fishmonger failed us at the last moment. The dinner was not fit to set before you." It is no use our replying that everything was exactly as it should be. They will insist upon it that we have a just right to feel aggrieved.

Who can feel at ease with persons of this description? True politeness is admirably defined by La Bruyere as the art of making ot ers, by our words and our speech, satisfied with us and with themselves. Importunate politeness simply makes us uncomfortable ourselves, and dissatisfied with those who subject us to it. A well-bred person knows how to preserve the golden mean. He will never substitute for that gracious and natural courtesy which is the fairest flower of civilised society, a fussy and fidgetty politeness which is in the highest degree irksome.

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ODDITIES OF ORATORS.

The methods of preparing speeches, and the manner of speaking among celebrated orators, are as various as the orators themselves. Some, with a great talent of expression, and a natural ability to give easy and rapid utterance to thought, trust to the inspiration of the moment, and speak offhand, or, at least, without written preparation. Such is the case with many noted preachers: among others, Spurgeon and Beecher. Others make notes or headings of their subject, and frame here and there a sentence ; they leave the rest to a careful study of their subject and to the moment of speaking. Others, again, carefully write out the whole of their speech, and either commit it to memory or con it over very thoroughly before appearing in public to deliver it.

Webster and Everett always carefully prepared their orations in this way, while Clay often spoke with little or no preparation. John Bright makes notes and headings of his speeches, and with great care writes off and commits to memory their most important passages. Gladstone jots down only facts and figures, and for his expressions trusts entirely to the moment of speaking. Lord Derby wrote out every word, and usually committed his speech to memory. M. Thiers was equally as precise, while Gambetta, one of the greatest French orators, spoke extempore, and his marvellous eloquence was the result of the inspirations of the moment. Sumner precomposed verbally his great speeches in the laboratory of his brain, memorising them, being afterwards able to produce the eloquent sentences in the order he had thought them out.

"Why, how nervous you are," said a friend, on taking Canning's hand, just before he rose to speak. "Am I ?" was the prime minister's reply. "Then I shall make a good speech." Daniel Webster, on the other hand, was cool, calm, collected. His nerves were of iron. Everything had been thought out before he rose to speak.

A junior counsel once congratulated Sir William Follett on his perfect composure in the prospect of a great case he was about to try. Sir William merely asked his friend to feel his hand, which was wet from nervous anxiety. This nervousness and anxiety seems a condition of oratorical success. The late Lord Derby, "the Rupert of debate," as he was named by his admirers, said that his principal speeches cost him two sleepless nights, one in which he was thinking what to say, the other in which he was lamenting over what he might have said better.

Cicero, according to Plutarch, not only wanted courage in arms, but in his speaking also. He began timidly, and in many cases he scarcely left off trembling even when he got thoroughly into the current and substance of his speech. Cowper's friends procured him a place as clerk in the House of Lords, where his duties only required him to stand up and read Parliamentary notices and documents. The thought of standing up before such an audience was so terrible to him, that as the time drew on, he was in an agony of apprehension, and tried to hang himself. The famous Curran had a sensitiveness in public speaking which often hindered his success. He was painfully affected by any mark of inattention in his audience. If anyone fell asleep, or stared vacantly about the room, his eloquence began to flag, and much of his power was lost.

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WHO WAS THE DINNER FOR?

William Fox, of Nottingham, was a member of the Society of Friends, and he was one of the true old school of Friends. His sympathy for the poor was deeply excited by serving the office of overseer ;

and seeing how poor some were who had to pay poor-rates, he resolved to economise the parish funds, and thus prevent their miseries as much as possible. It was the custom then in many parishes for the overseers and the committee who attended the weekly payments of the paupers to have a good dinner at the close of their day's labour, and this was paid for out of the poor-rates; but as it was a manifest abuse, he determined to put an end to the practice. He, therefore, hastened away before the close of the weekly payment to the dining-room, and thus addressed the master of the workhouse:

"Is the dinner ready?"

"Yes, sir."

"Then, bring it in."

"Are the gentlemen ready, sir."

"Never mind the gentlemen. I say bring it in."

And this was done.

"Now, call all the poor people, friend—now, call all the poor people. Dost thou not hear what I say, sir?"

"This dinner is for the gentlemen."

"For the gentlemen? Oh! Who pays for it then—do the gentlemen?"

The workhouse master, staring most amazingly, said, "Why, no, sir, I reckon not. It's paid for out of the poor-rates."

"Out of the poor-rates? To be sure it is. Thou art right. The rates are for the poor men, and not for the gentlemen. Poor rates—eh? I think we have no gentlemen's rates; so fetch in the poor at once, and look quick."

The workhouse master went, and William Fox went too, to see that he did as he was ordered, and not to give the alarm to the gentlemen, and in a few seconds was hurried in a whole host of hungry paupers, who had not for years set eyes on such a feast as that. They did not wait for a second invitation to place themselves at table.

William Fox then bade them help themselves, and at once there was a scene of activity that for the time it lasted justified the name of the house. It was a workhouse indeed. William Fox all the time stood cutting and carving and handing good pieces of pudding and meat to such as could not get seats. In a few minutes there was a thorough clearance of the table.

Scarcely had William Fox dismissed the delighted company when another company presented themselves, and these were the gentlemen, who stood in amazement.

"Why," exclaimed they, "what is this? Why is the table in this state? Where is the dinner?"

"I found a very good dinner ready, and as I knew that none but the poor had a right to dine out of the parish funds, I have served it out to the poor accordingly; but if any of you is in want of a dinner, he may come home with me, and I will give him one." The gentlemen knew well the character they had to deal with, and never attempted to renew the practice of dining at the parish cost during William Fox's year of office.

BEGINNING OF THE YEAR IN VARIOUS NATIONS.

The Chaldeans' and Egyptians' years were dated from the autumnal equinox.

The ecclesiastical year of the Jews began in the spring; but in civil affairs they retain the epoch of the Egyptian year.

The ancient Chinese reckoned from the new moon nearest the middle of Aquarius.

The year of Romulus commenced in March, and that of Numa in January.

The Turks and Arabs date the year from the 16th of July.

Dremschid, or Gremschid, king of Persia, observed on the day of his public entry into Persepolis, that the sun entered into Aries; and in commemoration of this fortunate event he ordered the beginning of the year to be removed from the autumnal to the vernal equinox.

The Brachmans begin their year with the new moon in April.

The Mexicans begin it in February, when the leaves begin to grow green. Their year consists of eighteen months, having twenty days each; the last five days are spent in mirth, and no business is suffered to be done, nor even any service at the temples.

The Abyssinians have five idle days at the end of their year, which commences on the 26th of August.

The American Indians reckon from the first appearance of the new moon at the vernal equinox.

The Mohammedans begin their year the minute in which the sun enters Aries.

The Venetians, Florentines, and the Pisans in Italy, began the year at the vernal equinox.

The French year, during the reign of the Merovingian race, began on the day on which the troops were reviewed, which was the first day of March. Under the Carlovingians it began on Christmas day, and under the Capeatians on Easter day. The ecclesiastical year begins on the first Sunday in Advent. Charles IX. appointed in 1564, that for the future the civil year should commence on the 1st of January.

The Julian calendar, which was so called from Julius Cæsar, and is the old account of the year, was reformed by Pope Gregory in 1582, which plan was suggested by Lewis Lilio, a Calabrian astronomer.

The Dutch and the Protestants in Germany introduced the new style in 1700.

The ancient clergy reckoned from the 25th of March; and the method was observed in Britain until the introduction of the new style, A.D. 1752, after which our year commenced on the first of January.

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COMMON SENSE IN DIET.

Since over-eating is the cause of many diseases, fasting should be their natural cure. If beef and brandy cause the gout, brown bread and cold water ought to cure it, and so they do. No vegetarian and water drinker ever had the gout. Pure food makes pure blood, and pure blood makes a healthy body. The practical rule of avoiding serious exertion of mind or body immediately after eating, has long been acted upon in our treatment of the lower animals; no one who sets any value on the lives of his horses or dogs ever allows it to be disregarded in respect to them. And yet the same man who would unhesitatingly dismiss his groom for feeding his horse immediately after a fatiguing chase or gallop home, would probably think nothing of walking into the house and ordering dinner to be instantly served for himself in similar circumstances.

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THE SPEED OF THOUGHT.

A writer in the *Nineteenth Century* has made some interesting calculations regarding the comparative length of time it takes to call to mind various everyday facts.

It takes about two-fifths of a second to call to mind the country in which a well-known town is situated, or the language in which a familiar author wrote. We can think of the name of next month in half the time we need to think of the name of last month. It takes on the average one-third of a second to add numbers consisting of one digit, and half a second to multiply them. Such experiments give us considerable insight into the mind.

Those used to reckoning can add two or three in less time than others; those familiar with literature can remember more quickly than others that Shakspeare wrote "Hamlet." It takes longer to mention a month when the season has been given than to say to what month a season belongs.

The time taken up in choosing a motion, the "will time," can be measured as well as the time taken up in perceiving. If I do not know which of two coloured lights is to be presented, and must lift my right hand if it be red, and my left hand if it be blue, I need about one-thirteenth of a second to initiate the correct motion. I have also been able to register the sound waves made in the air by speaking, and thus have determined that in order to call up the name belonging to a printed word I need about one-ninth of a second, to a letter one-sixth of a second, to a picture one-quarter of a second, and to a colour one-third of a second.

A letter can be seen more quickly than a word, but we are so used to reading aloud that the process has become quite automatic, and a word can be read with greater ease and in less time than a letter can be named. The same experiments made on other persons give times differing but little from my own. Mental processes, however, take place more slowly in children, in the aged, and in the uneducated.

" ON THE FENCE."

This phrase, which is a very common one, is said to have originated as follows: General Washington once asked a negro belonging to Judge Imlay, of New Jersey, whether his master was a Whig or a Tory. The reply was: " Massa on de fence; him want to know which de strongest party."

The Duke of Savoy is made responsible for the present meaning of the word turncoat. He did not wish to ally himself permanently with either France or Spain, so had a close coat made that was white on one side and scarlet on the other. When it was convenient for him to be for France, he wore the white outside; but when he preferred to favour Spain, he turned it, and had a red coat. Hence a person who changes his politics is a " turncoat."

"Is your father at home?" asked an Englishman of a Welsh boy, whom he met at Llandrilloynrhos. 'No, sir; he's gone to work at Llansantffraidglan-Conway." " Is your mother in, then?" " She's gone to the fair at Llanfairmathafarneithaf." "Dear me! but where is your sister?" "My sister has gone to Llanfairpwllgwyngyllgogerychwyrudrobwllsanttysiligogoch.' "Good gracious!" exclaimed the Englishman.

WHAT YOU CAN AND CANNOT CALL A MAN.

Though an animal, a man does not like to be called a " beast;" yet there are many known as " bulls" and "bears" that accept these appellations as rightly bestowed and properly belonging to them, though individually, in another sense, they would object to being called bears. There are many who would like to be known as "lions," and even "tiger" would be considered more complimentary than "calf." Many a young fellow would like to be regarded as a " buck," and you may call a man "dear fellow," but don't think of calling him a "moose." To be called a " duck of a man" would please many an individual who would take it to heart if called a "goose," independent of the misnomer. Call a man a "puppy," and he'll resent it; but call him a "sly dog," and you'll rather please him. Don't call a man a "hog," even if he is a bore, nor an " elephant," if he happens to be a " heavy weight," but you may call him a "fox" or a "coon" with impunity. A man doesn't like to be called a "shark," but you may call him a "queer fish" without offence. Call a man a "jackass" and he'll "talk back;" but you may call him an "old rat," and it's ten to one he'll ask you to "take suthin." A man who wouldn't feel complimented at being called a "cormorant," would smile at being a "night owl." Don't call a man a "fool," call him a "clever fellow," which amounts to the same thing, but sounds prettier. A man would be well pleased to know that you said he was "keen as a razor," yet would object to your calling him a " sharper." To call a man a "stone" would be considered reflecting upon his intellectual powers, but you may call him a " brick " to his great satisfaction.

THE ENGAGEMENT RING.

About the happiest day in the life of a young lady is the day upon which she receives an engagement ring. She will hold her hand up and look at the ring from all points and admire it, and assure Adolphus he is just too awful nice for giving it to her. And she always wears it that day, no matter what happens. If the ring is too large for her she will ram bits of wood under it, just as the boy puts branches of trees and other things under his skate straps to keep his skates on. And, after she gets it fixed to suit her, she starts out to call on her friends. They all know before she arrives that she has received a ring, and are on the *qui vive.* They either tell her it is very pretty or else they pretend not to notice it at all, in either of which cases the recipient of the ring is delighted beyond description. Because if they compliment her she thinks they are affecting an indifference to her good luck and that they will tear her to pieces after her departure. And if they don't say a word or notice the ring the young lady knows that they are wild with envy, and would give their ears to be in her place. And she calls on everyone she knows, and removes her gloves at every house, even if she remains therein but two minutes.

CROMWELL'S PLUCK AS A BOY.

One of his mischievous schoolboy pranks —perhaps an unauthorised raid on an orchard—had brought on him the displeasure of his mother, who inflicted a severe chastisement on the delinquent, and sent him to bed early in the evening. Oliver was sobbing with anger and pain, when a servant, entering the bedroom upon some errand, happened to say to him that Mrs. Cromwell had gone to pay a visit to a sick friend, and intended returning alone by a path across the fields, a distance of two or three miles. The moment the servant was gone and the door closed, the boy sprang out of bed, hastily dressed himself, got out of the house unobserved, so as to avoid meeting any of the domestics—who would, doubtless, have stopped him—possessed himself of a light spade, and sped off in the direction of the route his mother would have to take on her return. He had traversed a considerable portion of the distance when he met his mother. "There—there is a savage bull"—said the still sobbing and excited boy, in reply to Mrs. Cromwell's exclamation of surprise— "in the field yonder, brought there I knew to-day, and I—I thought he might run at your red cardinal, and so I slipped out and came." The mother was touched by her son's affectionate care, and having rewarded him with a kiss, was proudly escorted by the courageous lad across the field in which the fierce and dangerous animal was pastured.

BOYHOOD OF EMINENT MEN.

It appears that early prococity is no necessary condition of genius or intellectual eminence in after-life; for the youth of Sheridan was pronounced to be "dull," and that of Goldsmith "unpromising." In his boyhood, Sir Isaac Newton was "inattentive to study, and ranked very low in the school until the age of twelve;" in his boyhood, Napoleon was in no way distinguished from other boys; in his boyhood, Sir Walter Scott gave no indications of his future eminence; in their boyhoods, neither Shakespeare, nor Gibbon, nor Davy appear to have exhibited even the common elements of future success. It will be found that the mere circumstance of a slow and tardy development of the intellectual power affords no certain indication of the future capabilities of the mind, and that precocity should be restrained rather than encouraged.

STARVATION POINT.

If we cannot say with any precision how long starvation will be in effecting its fatal end, we can say how much waste is fatal. From the celebrated experiments of Chossat, on inanition, it appears that death arrives whenever the waste reaches an average proportion of 0·4; that is to say, supposing an animal to weigh one hundred pounds, it will succumb when its weight is reduced to sixty pounds. Death may ensue before that point is reached, but not be prolonged after it. The average loss which can be sustained is forty per cent.; sometimes the loss is greater, if the animal be very fat. Fishes and reptiles were found by Chossat to perish at precisely the same limit of weight as warm-blooded animals, but they required a period of three-and-twenty times as long to do it in; thus, if the experiment be performed of starving a bird and a frog during the warm weather, although both will perish when their loss of weight reaches forty per cent., the one will not survive a week, the other will survive three-and-twenty weeks.

Interesting Extracts.

AN UNRECOGNISED MONUMENT.

"It was after the battle of Inkermann," said my friend the old soldier, "me and a lot more was stretched out in that shed at Scutari, some on us with shell wounds, others with bayonet thrusts, and me with a bullet in my leg. The doctors were just finishing their first round—they was mostly young fellows, them doctors, with a jocular tone, and a free and easy way of getting through *our* troubles—when Miss Nightingale came in. She just stood at the door, and looked round the walls. Best part of us had got a cross chalked up over our heads, signifying as our limbs was to be took off. She took stock of these crosses, and then coming over to me as I lay there near the door, she says—

"'Well, my man, what's the matter with you?' she says.

"'A ball in my thigh, miss,' says I, 'and the young doctor has given me the cross for fear Her Majesty might forget it, he says.'

"'That's a very good joke for *him*,' she says; 'come, let me look at it.'

"'Well, miss,' I says, hesitating like, for you see my wound was in the thigh.

"'Come, come,' says she, 'this is no time for blushing.'

"So I turned down the rug and untied the red hankercher I'd bound round it in the night.

"'Why, I shouldn't wonder if your sweetheart give you that hankercher,' says she, quite pleasant like—which was a fact true enough, for my Jane gave it me the very day we were marching through the park at home for the last time; and then Miss Nightingale says, 'You've got a sweetheart, haven't you, away there in England?'

"'Yes, miss,' says I; 'and a good gal she is. Shall I tie the hankercher on now, miss?'

"'Not yet,' she answers, kneeling down and touching the wound gently with her delicate fingers. 'So she's a good girl, eh?' Miss Nightingale went on to say; 'then I'll be bound she's praying to God to send you safe home.'

"'Poor gal,' says I. She'll be sorry to hear that I've lost my leg, and I can't expect her to marry me with only one.'

"'No, that wouldn't be fair,' she says, opening the wound softly—'Ah, what's that?' she cried, and then, suddenly dipping in her fingers, pulled out the bullet.

"'Tie up your leg, my poor fellow,' says she. 'You'll be able to marry your sweetheart after all.' Then, calling to the young doctors, she held up the bullet, and, pointing to the cross on the wall, asked them if they thought they were serving their country and their God as Christian gentlemen should.

"She saved many a poor man's limb and many a poor man's life, and in gratitude we all on us wanted to give what we had for a little present to her. I offered to give her all the money I had, but our colonel said she wouldn't take nothing but a penny from each soldier. Well, sir, we give that readily enough, and a lot it came to altogether, I expect."

"What became of the subscription?"

"Why, sir," answered the old warrior, "they melted the coppers, and made an image of it, and set it up there in Pall Mall near the Duke o' York's column. You should go and see it, sir; it's beautiful. It ain't exactly like Miss Nightingale as I see her, but there she stands in her bed-gown, holding a couple o' bandages out over the heads of two guards."

Frank Barrett.

ADVICE TO PARENTS.

If a child commences a dogein and a dukein its hed, and a throwin its littel hans and arms up over its face, in self-protexun as it wer, whenever yu make a effort tu smuthe its hare, yu may be sertin that the parents uv that child are in the habet uv nockin it over the hed, and uv boxin its ears, fur a child has the facelty uv tellin a grate many things without sayin anything by the word uv mouth. If yu want a child tu grow up smart, yu shood begin erely tu nock it over the hed and box it over the ears, as any wun can see how much smarter a child will naterly grow if it has its soft and tender brane jarred up in that way. It don't make any particular difference what part uv the hed yu begin on, nor which ear yu box first, as the brane is as soft and tender in wun place as anuther, and the ear drum is as easy busted on the right side as the left. The mane thing is tu nock it hard enuff tu make it see stars a flashin befour its ize.

The practis uv nockin the childern on the hed is anshent, a most any wun can remember how tha enjoyed bein nocked on the hed when tha wus littel, and how tha longed fur the da tu cum when tha cood du likewise tu sum other child's hed.

Judgein from the number uv parents a practisin it, it must be a plesant amoosment, and it ought tu be encuraged, as it helps amazinly tu keep the insain asylums full, and gives stedy employment tu the docters. If yore child should cri in the nite with the ear ake, accordin tu the homapatha rule uv like cures like, it would be a good idee tu give it anuther box over the ear. And then if wun uv of yore littel fellers shood di uv brane fever, it wood be such a consolashun tu visit its grave every Sunda, and while a puttin flours onto it, think over how many hundred times yu had nocked the deer littel departed on the hed, there is sumthin very consolin in such thots.—*Unkel Josh.*

◆

HUNGER FOR PRAISE.

Woman's efforts to please in the matter of cooking are rarely appreciated, or, if so, she hears no word of commendation. Men do not seem to realize how much a woman's heart hungers for words of praise from her husband's lips. If she prepares some dainty dish to tempt his appetite, he is too careless to note how eagerly she waits to know if he likes it. Appreciation is one of the best incentives the world affords. After the labours incident to the preparation of a meal, how it seems to rest a wife to hear her husband say: "How nice and light your biscuits are," or: "Wife, this meat is cooked to suit my taste," or other words of commendation. A few words of approval pay her for her trouble.

Just try this for once, careless husband, and see if your wife's face don't light up, and all traces of weariness disappear on the instant. Oh, think of the many things you can do to brighten her life. A little appreciation by one she loves goes a good way toward making a woman happy. Many a weary wife drags out her life unappreciated, scarcely finding a word of sympathy from her husband.

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PRIDE AND ITS MANY FORMS.

Pride is not the heritage of man: humility should dwell with frailty, and atone for ignorance, error, and imperfection.—*Sydney Smith.*

Pride should of young men be carefully avoided, of old men utterly disdained, and of all men suspected and feared.—*Socrates.*

Beware of that pride which makes a parade of being humble, and avoid all occasions of showing thyself before men.—*T. Hook.*

There are no friends more inseparable than pride and hardness of heart, humility and love, falsehood and imprudence.—*Lavater.*

Of all human actions, pride seldom obtains its end; for aiming at honour and reputation, it reaps contempt and derision.—*S. Walker.*

Deep is the sea, and deep is hell, but pride mineth deeper; it is coiled as a poisonous worm about the foundations of the soul.—*Tupper.*

Pride seems to be equally distributed; the man who owns the carriage, and the man who drives it, seem to have just alike.—*H. W. Shaw.*

It is pride which fills the world with so much harshness and severity. We are rigorous to offences, as if we had never offended.—*H. Blair.*

Men of fine parts, they say, are often proud; I answer dull people are seldom so, and both act upon an appearance of reason.—*Shenstone.*

It is the most nonsensical thing in the world for a man to be proud, since it is in the meanest wretch's power to mortify him.—*Sir T. Browne.*

Of all the roots of bitterness in human nature from which mortal evil grows, there is none more luxuriant and prolific than pride.—*Victor Schœlcher.*

Pride, like the magnet, constantly points to one object—self; but, unlike the magnet, it has no attractive pole, but at all points repels.—*Colton.*

Great gifts are beautiful as Rachel; but pride makes them also barren like her. Either we must lay self aside, or God will lay us aside.—*W. Gurnal.*

There are some who feel more pride in sealing a letter with the head of Homer, than even that blind old bard did in reciting his Iliad.—*Hazlitt.*

You who are ashamed of your poverty, and blush for your calling, are a snob; as are you who boast of your pedigree, or are proud of your wealth.—*W. M. Thackeray.*

* * *

We cannot always oblige, but we can always speak obligingly.—*Voltaire.*

There is no Christian duty that is not to be seasoned and set off with cheerfulness. —*Milton.*

The happiness of love is in action; its test is what one is willing to do for others.

If we rightly estimate what we call good and evil, we shall find it lies much in comparison.—*Locke.*

Power is so characteristically calm, that calmness in itself has the aspect of power, and forbearance implies strength.—*Bulwer Lytton.*

It is a happy thing for us that this is really all we have to concern ourselves about, what to do next. No man can do the second thing.—*George Macdonald.*

It is our constant habit to link innocence with beauty. And it is difficult to conceive a lover of nature as wholly worldly-minded or essentially bad. For he who takes a sincere and deep pleasure in the handiworks of God, who appreciates the richness of nature's blessings sufficiently to hunger for them, who knows for himself the joy there is in the sunlight, the moonlight, and the stars—in the humblest flower, a beautiful tree, a picturesque, grand, or sublime effect, has a source of wealth within himself which must inevitably make all purely corrupting desires seem cheap and ignoble. The love of nature cherished through childhood to manhood is indeed an unspeakable blessing to its possessor.

* * *

A GENTLE COMPLAINT.

Some time ago Barnum's show was burnt out, and some of the animals escaped. This will explain the following letter :—

Fairfield, Conn.

P. T. Barnum, Esq. :—

Dear Sir,—We have a large soiled Asiatic elephant visiting us now, which we suspect belongs to you. His skin is a misfit, and he keeps moving his trunk from side to side nervously. If you have missed an elephant answering to this description please come up and take him away, as we have no use for him. An elephant on so small a place as ours is more of a trouble than a convenience. I have endeavoured to frighten him away, but he does not seem at all timid, and my wife and I, assisted by our hired man, tried to push him out of the yard, but our efforts were unavailing. He has made our home his own now for some days, and he has become quite *de trop*. We do not mind him so much in the day-time, for he then basks mostly on the lawn and plays with the children (to whom he has greatly endeared himself), but at night he comes up and lays his head on our verandah, and his deep and stertorous breathing keeps my wife awake. I feel as though I were entitled to some compensation for his keep. He is a large, though not fastidious eater, and he has destroyed some of my plants by treading on them; and he also leaned against our woodhouse. My neighbour—who is something of a wag—says I have a lien on his trunk, for the amount of his board; but that of course is only pleasantry. Your immediate attention will oblige. —*Simeon Ford, in "Puck."*

HOW TO TAKE REST.

How differently men and women indulge themselves in what is called a resting spell! "I'll sit down and mend these stockings and rest awhile," says the wife; but her husband throws himself upon the easy lounge, or sits back in his arm-chair, with hands at rest, and feet placed horizontally upon another chair. The result is, that his whole body gains full benefit of the half hour he allows himself from work, and the wife only receives that indirect help which comes from change of occupation. A physician would tell her that taking even ten minutes' rest in a horizontal position, as a change from sitting or standing at work, would prove more beneficial to her than any of her makeshifts at resting. Busy women have a habit of keeping on their feet just as long as they can, in spite of backaches and warning pains. As they grow older they see the folly of permitting such drafts upon their strength, and learn to take things easier, let what will happen. They say: "I used to think I must do thus and so, but I've grown wiser, and learned to slight things." The first years of housekeeping are truly the hardest, for untried and unfamiliar cares are almost daily thrust upon the mother and home-maker."
—*Domestic Monthly.*

◆

TRAPS FOR SCHOOLBOYS.

Every man who has boys of his own, or who has the charge of other people's children, must heartily wish that it were possible to protect schools, and, for the matter of that, colleges as well, from the pests which annoy them now. Money-lenders, betting agents, and the purveyors of impure literature regularly pour their circulars into some public and private institutions, and they are wary enough to make it all but impossible to recognise their communications from the envelope and its direction. Where money has been lent to a boy, if only he is frank, and confesses his folly before it has gone too far, the remedy is simple—to refuse payment in any shape or form. Such a course is justified both by conscience and by law. In other and worse cases, unfortunately, there is no cure of this kind available. The book once bought and read, the bet once made, the harm is done and cannot be undone. It is not possible—it would not be wise if it were possible—to remove all temptation out of a boy's path. If he is to gain manly self-control he must be trained to it from his earliest years. But he will find quite enough evil to contend against in the moral atmosphere of any great or, still more, of any small school; the effort will tax his strength enough without the addition of other hostile forces. One thing might and ought to be done. If every schoolmaster and tutor would promptly hand over to the police all objectionable letters and advertisements that come into his hands, the stream of evil would be considerably diminished, if not dried up. But men in their position, not without cause, fear and shun the publicity to which such a course may lead. The British parent hates a scandal, especially in the cause of good, and public spirit, as most of us know, is a most costly virtue.
—*Sunday Magazine.*

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An ill-humoured wife, abusing her husband on account of his mercenary disposition, told him that if she was dead he would marry Satan's eldest daughter, if he could get anything by it. "That's true," replied the husband; "but the worst of it is, in England one can't marry two sisters."

◆

Emerson: "A beautiful woman is a practical poet; taming her savage mate, planting tenderness, hope, and eloquence in all whom she approaches."

Thackeray: "Almost all women will give a sympathising hearing to men who are in love. Be they ever so old, they grow young again in that conversation, and renew their own early time. Men are not quite so generous."

Humorous.

THE DIPLOMATIC TRAMP.

"Madam," said the tramp, as he stood at the back door. "Madam, would you mind givin' a poor man wot hain't had nothin' for two days a few cold victuals?"

"Yes, sir; I would mind it. You are able to work, and you won't get anything here."

"Good-bye, ma'am; if I can hold to drag myself away from yer yard, you'll never see me ag'in. But it is hard, madam, to be thus unfeelin'ly treated after standin' up for yer fam'ly when it was slandered."

"When did you do that?"

"Jes' now, at the next house. Yer little boy was over there, and the woman called him a red-headed brat, an' told him to go home. She were bringin' me a great floppin' jag o' grub on the platter at the time, but I couldn't stand it, an' I says, sez I, 'Madam, the little feller's hair hain't red.'"

"Ah, I see, and you lost the food by it! But hold on; I'll make it all right with you. Red-headed, indeed! The child's head is no more red than mine!"

"Thankee, madam, that looks like the stuff. Cold ham—yes, yes. A little too salt is the only trouble with it. I 'low this is baker's bread—better'n you'd be likely to make, I reckon. You should al'ays take the stones out of plum sauce, madam. No mustard fer the ham? Ah! yes, you have, thankee. Don't care fer any beans, madam—feed 'em to your husband! I'm very fond of pie—keep the plate, madam—though the under-crust on this is jest a little mite raw an' doughy. You should 'a' warmed the coffee a little—try an' mind it the next time I call. Jes' do up that chicken an' them tarts for me—in printed paper, please, mornin' paper preferred, then I can read an' improve my mind. Very keerful of my mind, madam, very. Well, good-bye!"

THE BRIDEGROOM'S TROUSERS.

A capital story was told the other day by the Hon. Emily Kinnaird. In a speech she was delivering, she illustrated the occasional failure of philanthropic schemes through want of concert among those starting them, stating what recently happened to a pair of trousers. The young man to whom they belonged had purchased them for his wedding, and on the eve of that auspicious day he discovered that they were two inches too long. So he went down to his mother and two sisters and informed them of the calamity. They sympathised with him vaguely and said no more. In the course of the evening his mother went up, cut off the two inches, hemmed them, and put them in the drawer. At supper-time his elder sister remembered his request, and went and removed another two inches, and put them away without mentioning what she had done. Bedtime came, the younger bethought herself of his difficulty, and they were again diminished by two inches. What the bridegroom said or did the next day we are not told.

◆

REMARKABLE PRESENCE OF MIND.

Pat Hoolihan, while slating the roof of one of our highest buildings, lost his footing and fell.

Over and over he went until within twenty-five feet of the pavement, when he struck a telegraph-wire and managed to grasp it, first with one hand, then with both.

"Hang on for your life, Pat!" shouted his fellow-workmen, and the bystanders rushed to the nearest dwelling for a mattress.

Pat held on for a few seconds, when suddenly, with a cry, "Shtand from under;" he dropped and lay senseless in the street.

Whisky was used and Pat finally came to.

When asked why he did not hold out longer, he feebly replied:

"Oi wuz afraid the woire 'ud break."

He recovered.—*N. Y. "Life."*

A VERY FALSE ALARM.

On one of the Southern trains recently was an old lady who evidently had never before made a railway journey. After looking about her some time in curiosity, her eyes alighted on the alarm bell, and she asked a boy, who happened to be passing at the time what it was for. "That, marm," said the boy, with a wicked twinkle in his eyes, "is to ring the bell when you want anything to eat," and passed on. Shortly after the old lady reaching up to the bell gave it a vigorous pull. Of course the brakes were applied, the windows thrown up, questions asked, etc., the old lady sitting calmly through the confusion. Presently the guard came rushing into the car, exclaiming "Who pulled that bell?" "I did," replied the old lady, meekly. "Well, what do you want?" snapped the official impatiently. "Well," said the old party meditatively, "you may bring me some hash."

THE MASONIC SECRET.

A, who is a Mason, and B who is not, meet in Bristol, and conversation turns on the "craft," "which," said A, "is a most admirable thing, for we have a secret which enables us to travel anywhere on the line *without paying a halfpenny*."

"Oh," replies B, "I should like to know that secret."

"Well then, all you have to do is to join our society, B, and—there you are!"

"No," B wouldn't do that but he'd like to know the secret. "Tell you what I'll do," he says, "give me the sign, and I'll pay the value of your fare to London (where they were going) and back, and your expenses while you're there."

"Agreed!" responds A, "and now for the 'secret,' All you have to do when you ask for your ticket is to say, Ticket for—wherever you want to go, and *stroke your nose three times on the right side with your forefinger*."

A was thanked, and by-and-bye they reached the terminus. A, however, manages to get there a few minutes before B, and asks for two tickets for Paddington, and pays for them saying:

"I'll take only one; *a gentleman will call for the other in a minute*."

"But how shall I know him?" asks the clerk.

"Oh, that is very easy; he has a peculiar habit of *stroking his nose on the right side with his forefinger*."

"All right," is the remark, and away goes A, followed shortly after by B, who, of course, has obtained his ticket without paying for it.

Meeting A, mutual congratulations ensue, and off they soon start for the metropolis.

At the end of a week A has received a most *important letter* demanding his immediate return, so bidding B "good-bye," he comes back to Bristol.

Next day B thinks of returning, so going to Paddington Station he says to the clerk: "Ticket for Bristol," giving at the same time the "sign."

"Eighteen and six," bawls out the clerk.

"Ticket for Bristol," repeats B, at the same time rubbing his nose more vigorously.

"Eighteen and six, I told you."

This farce having been gone through till the patience of the clerk, who naturally deemed the man *non compos mentis*, was exhausted, he threatens to give B in charge if he does not leave.

Poor B, finding he had been sold, sees it is best to pay, which he does, and comes back to Bristol in no pleasant humour, and vowing vengeance on A, whom he happens to meet the very next day, and demands an explanation.

"Why how did you make the "sign," asks A.

"As you told me: Stroked the right side of my nose three times with my forefinger."

"No wonder, then," said A victoriously, "that you failed to get your ticket. *You made the wrong sign! That's* the sign for *leaving* Bristol; to return you should have stroked the *left* side of your nose. You couldn't expect to *go* and *return* with the same sign, could you?"

We have not heard whether this was deemed sufficiently satisfactory by B, but there the matter rests for the present.

Poetry.

ODE TO THE SUN.

Hail, owd friend ! aw'm fain to see thee :
Where has t' been so many days ?
Lots o' times aw've looked up for thee,
Wishin' aw could see thi face.
Th' little childer reawned abeawt here
Say they wonder wheer tha'rt gone ;
An' they wanten me to ax thee
T' show thisel' as oft as t' con.

Come an' see us ev'ry mornin' ;
Come, these droopin spirits cheer ;
Peep thro' every cottage window ;
Tha'll be welcome everywheer.
Show thisel i' o thi splendour ;
Throw that gloomy veil aside ;
What does t' creep to th' back o'th' cleawds for ?
Tha's no faults nor nowt to hide.

Flashy clooas an' bits o' foinery
Help to mend sich loike as me ;
Veils improve some women's faces,
But, owd friend, they'll noan mend thee.
Things deawn here 'at we co'n pratty,
Soon begin to spoil an' fade ;
But tha still keeps up thi polish,
Tha'rt as breet as when new made.

Tha wur theer when th' hosts o' heaven
Sweetly sang their mornin' song ;
But tha looks as young as ever,
Tho' tha's bin up theer so long.
An' for ages tha's bin shinin'—
Smilin' o' this world o' eawrs ;
Blessin' everythin' tha looks on,
Makin' th' fruit grow, oppenin th' fleawers.

It wur thee 'at Adam look'd on
When i' th' garden bi hissel' ;
An' tha' smoiled upon his labour—
Happen helped him—who con tell ?
It wur thee 'at Joshua spoke to
On his way to th' promised land ;
When, as th' good owd Bible tells us,
Theaw obeyed his strange command.

Tha'll ha' seen some curious antics
Played deawn here bi th' human race ;
Some tha' couldn't bear to look on,
For tha shawmed an' hid thi face.

Mony a toime aw see thee blushin',
When tha'rt leavin' us at neet :
An' no wonder, for tha's noticed
Things we'n done 'at's noan bin reet.

After o tha comes to own us,
Tho' we do so mich 'at's wrong ;
Even neaw tha'rt shinin' breetly,
Helpin' me to write this song.
Heaw refreshin' ! heaw revivin' !
Stay as long as ever t' con ;
We shall noan feel hawve as happy,
Hawve as leetsome, when tha'rt gone.

Oh ! for th' sake o' foalk at's poorly,
Come an' cheer us wi' thi rays ;
We forgetten 'at we ail owt
When we see thy dear owd face
Every mornin' when it's gloomy,
Lot's o' foalk are seen abeawt—
Some at th' door steps, some at th' windows,
Watchin' for thee peepin' eawt.

Samuel Laycock.

FORBEARANCE.

What might be done if men were wise—
What glorious deeds, my suffering brother,
Would they unite
In love and right,
And cease their scorn of one another.

Oppression's heart might be imbued
With kindling drops of loving kindness,
And knowledge pour
From shore to shore,
Light on the eyes of mental blindness.

All slavery, warfare, lies, and wrongs,
And vice and crime might die together ;
And wine and corn
To each man born,
Be free as warmth in summer weather.

The meanest wretch that ever trod,
The deepest sunk in guilt and sorrow,
Might stand erect
In self respect,
And share the beaming world to-morrow.

What might be done ? This might be done.
And more than this, my suffering brother—
More than the tongue
Ere said or sung,
If men were wise and loved each other.

MACKAY.

THE ENGINEER'S MURDER.

Yes, I once committed a murder,
  Outside the realms of law,
That I s'pose the body of people
  Would not heed the worth of a straw;
But I think I should sleep the sounder,
  Sometimes, when the night winds wail,
If I never remembered "murder,"
  Or never told over the tale.

No matter the road I was running—
  'Twas in one of the Middle States;
So many years since, that I wonder
  Why the sorrow never abates.
I was young, and hasty, and savage,
  As youth is apt to be,
And my hand—well my hand you will fancy
  Was a trifle too ready and free.

I was in my caboose just at evening,
  Say 'tween Holden and Fiddler's Run,
Making time to reach Wayman's Siding
  For the up-train at five twenty-one;
I had had a hot box at Grossman's,
  And that put me four minutes behind;
So I felt like—the word is ugly,
  But the truth! like "going it blind."

Round a curve, and running—say forty,
  Or it may have been fifty, who knows,
And there on the track before me,
  A black fiend at full scream arose!
A dog, that sat down in the middle,
  Between the two lines of rail,
And howled like a fiend incarnate,
  With a mixture of bark, yell, and wail.

Did I stop? Not much! I just opened
  The throttle-valve by a mite.
And over that dog she went flying,
  And over something else—white!
I stopped her then with a shdder,
  And ran back; in a mangled heap
Lay the dog, and what had been lately
  A baby-girl laying asleep!

Have I never got over it? No sir!
  And I never shall till I die!
Why didn't I hear the warning?
  It was only a black dog's cry.
I may have done many more murders,
  And 'tis likely I have on the whole;
But there's none, when the night winds are howling,
  That lay such a weight on my soul!

And what is the worst of my sorrow,
  Don't make the one grand mistake!
I should grieve twice, I've a fancy,
  For the poor dead baby's sake!
But the dog that was doing his duty
  So nobly, I grieve for him;
And I never tell over the story
  But I find my old grey eyes grow dim.

Henry Morford.

THE SKYLARK.

    Bird of the wilderness,
    Blithesome and cumberless.
Sweet be thy matin o'er moorland and lea!
    Emblem of happiness,
    Blest is thy dwelling-place—
O to abide in the desert with thee!
    Wild is thy lay and loud,
    Far in the downy cloud;
Love gives it energy, love gave it birth,
    Where, on thy dewy wing,
    Where art thou journeying?
Thy lay is in heaven, thy love is on earth.

    O'er fell and fountain sheen,
    O'er moor and mountain green,
O'er the red streamer that heralds the day,
    Over the cloudlet dim,
    Over the rainbow's rim,
Musical cherub, soar, singing, away!
    Then, when the gloaming comes,
    Low in the heather blooms,
Sweet will thy welcome and bed of love be!
    Emblem of happiness,
    Blest is thy dwelling-place—
O to abide in the desert with thee!

Hogg.

SHE KNEW HIM OF OLD.

She sat besides me at the play
  In all her girlish loveliness,
While in the box across the way
  A dowager in gorgeous dress

Sat, while the diamonds glittered bright
  On wrinkled neck and shoulders bare;
"Ah, were those gems my own," I cried,
  "I'd find for them a place more fair."

"Sweetheart," I whispered, "need I tell
  Where I would have those gems repose?"
She faltered not (she knew me well),
  "Why, with your uncle I suppose!"

Correspondence.

NOTICE TO CORRESPONDENTS.

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We reserve to ourselves the right to publish or reject any correspondence

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All correspondence to be addressed to Mr. T. G. Sunter, General Secretary, 17, Mill Hill Chambers, Leeds.

ORPHAN FUND.

Sir,—Seeing the desire to establish an Orphan Fund in connection with our Society is getting widespread, I have been looking into the Orphan Fund of the Amalgamated Society, to see what can be done in that respect, and I have come to the conclusion that an Orphan Fund can and ought to be added to our Society, and I think the sooner we get one the better for us. I will now give members an idea of what can be done in that respect.

On Good Friday last, Mr. Mundella, M.P., presided at a soirée and concert in connection with the A.S.R.S., and in the course of his remarks he had occasion to refer to the Orphan Fund of that Society, and in doing so he told his hearers that 421 children were being aided at their homes, at a cost to that Society of £1,800 per annum. Now there is scarcely 11,000 members in that Society, so that there is, so to speak, 4°/ₒ of orphans upon the membership of that Society.

Assuming that the 421 orphans receive an equal amount, it will be 1/8 per week each. Now, if there was the full 11,000 members, and with their contribution of one half-penny per week, they would contribute £22 18s. 4d. towards £35 1s. 8d., the weekly allowance to orphans. Now, if their contribution to this fund was one penny per week, they would meet this £35 1s. 8d. with £45 16s. 8d., so it will at once be seen that for one penny per week their Orphan Fund would be a self-supporting one, with a surplus of £10 15s. 0d. Divide this £10 15s. amongst the 421 orphans, and it will supplement their 1/8 by 6d., making 2/2 per orphan. Now, if one penny per week will do this in the A.S.R.S., with their liability to seven children per family, and having to meet the claims of members' families belonging to the different and more dangerous grades, it will be clearly seen that (E. & Y.) can have an Orphan Fund for one penny per week, and allow each child an equal sum of 2/- per week to the fifth child, that is what I think ought to be the allowance, with a stipulation for a charity grant to widows or guardians left with an exceptionally large number of children. I hope our members whose views this article meets will dilate and enlarge upon it, and try and bring home to our less informed members, the desirability and necessity adding such a fund.

Yours truly,

J. H., 38 Branch.

WALKING EXERCISE FOR ENGINEMEN.

The Secretary of Exeter branch writes: The increasing number of locomotive enginemen on the different lines of railway, stricken with attacks of paralysis between the ages of 50 and 60 years, leads our minds into a painful channel of thought. It is a distressing fact that so many are so taken off just as they naturally look forward to the few remaining years of their life to be spent in ease and repose. The continual motion and shake while running, on the foot-plate, acting on the nerves, has much to do with it. To counteract this, enginemen should lay down a rule, when each day's running is done, to take a walking exercise of about three miles before retiring to rest. I know this will cause a smile of incredibility from many of our good brothers, because they often feel too tired to take such exercise. But the fact still remains, it is a necessity with us that such is needed. In walking, the head should be held erect; our friend we too often carry on our backs with us on the engine, should be shaken off, so as to give expansion to the chest and freedom to the lungs. Happily for us, all the hours system, now taken up in earnest by the Board of Trade, will tell in our favour, and then more time for recreation will be given us. The opening of this subject will, it is hoped, have the desired effect of at least to modify the number of attacks from this dire disease.

FRONT CLEANING BY FIREMEN.

At the spring committee meeting of the Mutual Assurance Society, connected with the G. N. R. Locomotive Department, recently held at Paddington, a subject of much moment was discussed by them, namely, the large amount of sickness there is among its young members. From the ages of 20 to 30, at the end of last year it stood at 7·3. Compared with such societies as the Foresters' and Odd-fellows', which stood at 5·1, this certainly is startling. Between these ages all societies naturally look forward to its being the healthful sap and main spring of its strength; but the members of this society have to grapple with the difficulty of its being its weakness. The excellent committee went at once with commendable promptitude to the root of the matter, and from personal experience found that front cleaning by firemen was the chief cause of this heavy sickness. No one conversant with the subject can possibly doubt the fact, that firemen engaged in the process of front cleaning before going out with their trains is a fruitful course of sickness, by catching colds—the forerunner of almost every ailment that flesh is heir to. The courteous secretary promised to take the matter before the heads of the department, with a view to having the order rescinded.

A FEW WORDS OF ADVICE.

Fellow workmen, I wish to call your attention to the following few remarks. I think the time has arrived when every engineman and fireman should put on their thinking cap and reason with themselves what they should do to hold their position good.

I wish to call the attention of firemen especially. The firemen of to-day are the future enginemen, and I think they should do something to make the position of enginemen worth waiting for in the distant future. If there is nothing done I am afraid the responsible position of engineman will not be worth the holding. Without taking into consideration the length of servitude, exposure to all weather, hard work, and risk of losing life and limb for so many years, my advice is, join the Society at once, and after doing this, every member should do justice to himself and the Society, by living a sober and moral life. When this is accomplished there is a great victory won. You will then be respected by all. Employers know the value of sober and steady men. Men of this class are always respected by their employers, it matters not what their capacity may be.

By being members of our trades union societies, men have something to protect them in case of any accident, and have the best legal advice at their command at once, together with men of practical experience to watch the case on their behalf—I say men that we should be proud of. I conclude by reminding all concerned that it is not the intention of the Society to extort anything unreasonable from our employers. We only wish to hold our own, and conduct ourselves in such a manner as to gain the respect of our employers, so that the interest of employers and employed are identical, is the sincere wish of AN OLD ENGINEMAN.

SWANSEA BRANCH.

On Good-Friday the members of the Swansea Branch, together with a few friends and invited guests to the number of sixty, sat down to dinner, provided by the hostess of the Station Inn, Landire. The room was tastefully decorated, some very appropriate mottoes being attached to the wall, and prominent amongst others was the emblem of the Associated Society in massive gilt frame, the object of admiration by every one present. After ample justice had been done the inner man, the tables were cleared, and Mr. Christison, the greatly respected foreman at the G.W.R. Locomotive Department, elected to preside, which he did with great ability. The friendly bowl was passed around, and many and varied were the libations poured in honour of our society. The usual loyal and patriotic toast list was ably proposed and suitably responded to. A variety of songs were sang in grand style by members of our branch. Mr. William Davies, G.N.R. fireman, ably accompanying on the piano. The usual votes of thanks brought a most enjoyable and convivial meeting to a close, each and every one being highly pleased with the proceedings. This being the first gathering of the sort held by the Swansea Branch, it augurs well for the future, several of our members travelling from a distance to attend, and we are sanguine that a continuance of the same will be the means of inducing those who still stand aloof to join our ranks, for whom there is plenty of room and welcome, whenever they see their way to join us. It was highly gratifying to behold such a gathering together of enginemen and firemen, each one bent on acting according to honesty and faithfulness between employers and employed, where wrangling and discord were entirely banished, and kindly and brotherly feeling has taken its place. Such a sight as that is one not to be easily or soon forgotten by the true Unionist.

Fraternally yours, J.L.

[This arrived too late for insertion in April issue.]

Bristol,
April, 1888.

Sir,—In reading our last issue, I quite fall in with the view of the Reading branch Secretary, that much good might result from our Organising Secretary paying some of the branches a visit.

I am, yours truly,
T. Marsh,
Sec.. Bristol Branch.

Neath,
April 28th, 1888.

Dear Sir,—I am requested by the members of this branch, to forward to you a report of the Annual Meeting held here, in connection with the Society, and express a wish that it should be put in our *Journal.* I get on first rate with the *Journal*, and have but very little trouble to dispose of them. It is a splendid piece of work, and the Executive Council deserve the highest praise for their efforts in getting out the Journal for the intellectual advancement of its members; hoping that every member will avail himself of the opportunity of obtaining its numbers. There is every prospect of getting some more members here since the circulation of the Journal has begun. Wishing it every success,

Yours truly,
T. Edmonds.

AMBULANCE WORK.

Sir,—I am exceedingly pleased to notice that our Organizing Secretary, Mr. T. Ball, has taken up this important question, and also glad to find that we have in him one who appears to be well able to deal with it. I sincerely hope all branches of our Society will second his efforts by forming a class, devoting their time to study, and not allow themselves to rest satisfied until they have the satisfaction of knowing that they are holders of the badge or medallion of the St. John's Ambulance Association. "Now, sir, I notice in our February number that Mr. Ball kindly promises to give information as to the formation of classes, &c., and hope he will answer the following questions. 1st. What is the minimum or maximum of members that can join a class? 2nd. What number of lectures is it necessary to attend to enable a member to present himself for examination. 3rd. Is it at all difficult to obtain the gratuitous services of a medical man to prepare the members of a class for examination. 4th. Does Shepherd's *First Aid to the Injured* embrace all that we are likely to be examined on, or are there other books to study? 5th. Is it expedient to hold the meetings on Sundays, owing to the irregular hours and consequent inability of many locomotive men to attend at any other time? 6th. Does Mr. Ball propose to admit non-members of our Society into the classes? I presume he does. 7th. Was the class at Nottingham of which he speaks anything more than an "ambulance class," if so, what were the subjects discussed?

Perhaps, Mr. Editor, you will allow me to state my individual opinion is that at every locomotive centre of any note there should exist not only an ambulance class, but a debating or mutual improvement class open to all men who have a desire to improve themselves. And I am glad to know that I am not the only member of our branch who is of that way of thinking, as you may judge by the following minute passed at our branch meeting, held January 29th, viz.: "That the members of this "Society deem it expedient to introduce a "system whereby members of the Society "may from time to time read papers or give "short lectures, calculated to extend the "principles, &c., of trades unions, and to "promote the interests of enginemen and "firemen generally, and that it is desirable "to invite non-members to hear the said "papers or lectures, and that every member "do his best to make this plan a success." I give the above minute, Mr. Editor, in the hope that other branches will follow suit, for I have a firm conviction that every branch by united efforts might bring this plan to a successful issue, and I am satisfied that the bond of friendship will become more firmly sealed, and that we shall thus make ourselves better able to fight the battle of life, and not only improve our own intellect; but to add to the prosperity of the nation, for while I allow that "righteousness exalteth a nation," I do hold that upon the intelligence of the people in this democratic age is to a very great extent based the prosperity of a nation.

Wishing you every success and thanking you in anticipation,

Believe me,
Yours sincerely,
Samuel Roe, York.

May 7th, 1888.

Associated Society of Locomotive Engineers and Firemen.

Dear Sir,—Having been a member of above society from its commencement, it is with pleasure that I notice its annual growth and financial strength, but there is one thing lacking to make an all-round society, if I may be permitted to term it, and that is provision for widows and orphans of its members. Recently we have had two sad cases in the district where I am situated, viz., Sheffield, one poor woman left with a number of children, and another with four, and in each case subscriptions had to be made and drawings for prizes got up, to enable their families to make an honest livelihood. These things create a lot of toil on the part of those who take them up, and can easily be abolished by forming a fund in our Society for those who are unfortunately deprived of their bread-winner. I think if each driver paid 5s. and firemen 2s. 6d. per year, a sufficient sum could be obtained to keep them both from charity and the workhouse. As this subject has been now brought to the front, I hope we shall hear of some practical suggestions.

I trust you will give space in your next issue for these few remarks, and then perhaps some abler pen than mine will take up this case, and give some suggestions which will enable our leaders to form this most needful benefit, and thus make our Society one of the best in the land. It will also be an additional inducement for others, who are now holding aloof on this very account, to join us.

I would suggest that this matter receive immediate attention, as it is most urgent that something should be done.

I beg to remain, Yours,
Stoker.

ANSWERS TO QUERIES.

Outside Cylinders.—A diversity of opinion as to the relative merits of outside and inside cylinders. The chief objection to outside cylinders is, that they occasion a sinuous motion in the engine, which is apt to send the train off the rails ; but this action may be made less perceptible, or be remedied altogether, by placing a weight upon one side of the wheels, the momentum of which will just balance the momentum of the piston and its connections. The sinuous or racking motion of locomotives is traceable to the arrested momentum of the piston and its attachments at every stroke of the engine, and the effect of the pressure thus created will be more operative in inducing oscillation the further it is exerted from the central line of the engine.

The principle of the injector's action is that of induced current, of any kind, has a tendency to induce a movement in the same direction of any body it passes over or under. Thus, we are all familiar with the fact that a current of air called wind, passing over the surface of a body of water, sets waves in motion, and dashes the water high upon the shore above its original level. In the same way, a jet of steam moving very rapidly, when injected into a body of water under favourable conditions, imparts a portion of its motion, and starts momentum sufficient to overcome the original pressure of the steam. This is how the injector is made to force water into a boiler against the same pressure the steam is starting from. W. S., King's Cross.

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The Slide Valve.—Some of the Railway Companies who formerly used the slide valves with recesses drilled in them, have now adopted valves made of patent bronze, and abandoned the drilling process, which answered two purposes, namely, to reduce the friction and to lubricate the valves, but they have also taken out the springs which were formerly fastened to the steam chest cover, and which used to press the valves on to the facings, thus causing what would appear to be an unnecessary amount of friction. T.B.

The Principle of the Injectors Action.—There are many forms of injectors in use, but all of them conform to certain elementary principles in their mode of action. By the suctional action of a current of steam, water is drawn into the injector, and the steam coming in contact with the water supply drives it along the feed pipe with a force sufficient to lift the top clack, and allow it to enter the boiler, although it has to force it in against the pressure of both the steam and water in the boiler. This is a common form of injector, others are made for the purpose of extending the action of the injector under varied conditions, for making it work automatically under different pressures of steam, and for improving its capacity to lift water above its natural level. The injector was invented by Henri Giffard, an eminent French scientist. T.B.

The Roscoe Lubricator.—I believe there are some who still hold the opinion that the Roscoe cannot work with steam on, and the argument generally advanced is, that it is impossible for the oil to leave the lubricator on account of the pressure of steam in the tallow pipe when the regulator is open, but, to my mind, the best way of proving that it works with steam on, is by experimenting on the stationary engine, which has been done scores of times in the following manner :—The lubricator has been filled in the morning after the engine has been started, and kept running without cessation, and the lubricator has been examined with the engine still running, and not a particle of oil has been found in it. This is due to permeation. That the engine will get lubrication when the driver shuts off steam I admit. That is due to the fact that the lubricator contains an air tube affixed to the bottom tap, and when the regulator is opened the steam drives the air in the lubricator into the air vessel, and there it will remain until steam is shut off. When the pressure of steam is below the compressed air in the vessel or tube, the air expands itself and flows the oil, hence the necessity in running down gradients with steam to occassionally open the regulator and recharge the air vessel so that the engine may be kept lubricated. T. B.

QUERIES.

Can any of your readers inform me why engineers in constructing Locomotives at the present time, crowd the footplate so much with whistle columns, injector steam cocks, and clack boxes. It has been stated by some that it is a Board of Trade recommendation, so that the boiler-plates should not be weakened by too many holes being drilled in them. I feel sure there must be some good reason for it, as the footplates of the engines built some years ago look much better and neater in appearance, and the men worked with greater comfort. An answer will oblige,

Yours truly, H.B.

Will any of your readers state the nature and uses of a vacuum, and oblige,

W. T., King's Cross.

Supposing an engineer builds two engines with the same stroke and diameter of cylinder as each other, the slide valves, same lap, and the wheels one size, with both the boilers of equal pressure. Is it possible to make one of the two engines more powerful, and to run at a greater speed, and the consumption of fuel less than the other. W.S.S.

Society News.

The following branches report an increase of members:—

Swansea Branch, *April*, 1888.

Dear Sir,—I have pleasure in reporting an increase of two members at our last monthly meeting. I am, yours truly,

Branch Secretary.

Peterborough Branch,
April 27th, 1888.

Sir,—We keep making steady progress at this station; our last meeting was well attended, and one member accepted.

Yours fraternally,
J. F., Branch Secretary.

Cardiff, *April*, 1888.

Sir,—I am pleased to inform you that the *Journals* are taking very well, and I believe doing much good. We are admitting new members at each meeting.

I am, yours truly,
A. H., Secretary.

Sheffield Branch, *April*, 1888.

Sir,—I shall require a further supply of April *Journals*, and am glad to say that we make one and two members at each club meeting. From yours truly,

Branch Sec.

Pontypool Branch A. S. L. E. & F.,
Hanbury Hotel, Griffiths Town,
Nr. Newport, Mon.

Quarterly meeting of the above branch, held March 26th, there was a good attendance, all members paying up their contributions in good style. Two new members proposed and accepted. Others have promised to join our ranks, and I have reason to believe they will fulfil their promise, for when the branch met on April 9th we had the pleasure of making another new member. I think we are going on at a good steady pace. Secretary.

Sandhills Branch, *April*, 1888.

Sir,—I am pleased to say that our last meeting was well attended, and that we enrolled one new member. Yours, Sec.

Wolverhampton Branch,
April, 1888.

Sir,—Kindly allow me to add my testimony to the advisability of our Organising Secretary visiting the branches occasionally as suggested by the Secretary of the Reading branch in the April number of our Journal, on the following grounds :—

We had for some time the greatest difficulty in convincing men at this station of the genuine benefits our Society offered to enginemen and firemen, on account of the opposition we received from men belonging other organisations, who prejudiced the minds of their fellow-workmen against us, and to such an extent was this feeling manifested that, on one occasion, having engaged a room in which to hold a meeting for the purpose of forming a branch, we were surprised upon arrival at the meeting-house on the appointed night, to find that we could not have the room, and in answer to our inquiries as to the meaning of such a strange piece of business, we were informed by the proprietor that some enginemen had been during the week and cancelled the order. We were not long in coming to the conclusion who were the prime movers in this dirty piece of business, and it was afterwards proved that our suspicions as to the guilty parties were correct. However, we were not to be so easily beaten, so we went in search of, and quickly obtained, another room in which we held our meeting, and successfully opened our branch ; and since that time have been steadily increasing our membership, but I can assure you that it has been an up-hill battle, and the visit of Mr. Ball to our branch on Sunday, April 22nd, has been productive of much good, for not only have our members been strengthened and encouraged to make still further efforts through hearing of the good work done, and the progress made by the Society, but it has been the means of dispelling some unfounded rumours that had been circulated, and which we had to battle against, for after Mr. Ball had addressed the meeting for some considerable time upon the objects and benefits of of the Society, and of the advantages to be derived by enginemen and firemen belonging to an organisation composed of men of their own calling, he answered several questions put to him, in a manner that turned the tables upon some of the oppositionists, who, no doubt, finding the meeting too warm for them, suddenly remembered they had other engagements, and I feel certain that the majority of the non-members present were convinced that the Society had been grossly misrepresented to them, and that they had been greatly misled, and six of them have given me their names for enrollment next club night, and a Stourbridge driver paid his entrance fee, and now we are looking forward to more prosperous times, for I believe that the men at this station will take some persuading to believe anything again advanced against the interests of our Society by the persons who gave birth to the rumours that have for a time given us so much trouble, but which have now vanished into thin air by the visit of our Organising Secretary, and as other branches may have difficulties of a similar nature to contend against, an occasional visit might be productive of much good. A representative of the Birmingham branch did us good service during the evening, and several of our members also addressed the meeting for a short time, after which a hearty vote of thanks was accorded the Organising Secretary for his address, and the meeting brought to a close.

I remain, yours fraternally,
T. Evans, Branch Sec.

ASSOCIATED SOCIETY OF LOCO. ENGINEERS AND FIREMEN.

ANNUAL MEETING AT NEATH.

The annual meeting of the Associated Society of Loco. Engineers and Firemen took place on Good Friday at the Three Cranes Inn, Neath. The Mayor (Mr. John Rees) occupied the chair, the company including Mr. E. C. Curtis (town clerk), Councillor Markham, Mr. Pomeroy, Mr. Venables, Mr. Shilling, Mr. J. S. Church, and Mr. Savours, in addition to over 70 members of the Society. The club room in which the meeting took place was prettily decorated, and a capital dinner was served by Mr. and Mrs. Roberts.—The Mayor read letters of apology for their absence from the high sheriff (Mr. Rowland), Dr. T. P. Whittington, and Mr. D. Thomas.—Mr. Markham proposed "Success to the Great Western Railway Company," coupling with the toast the name of Mr. Pomeroy, to whose zeal and business tact he paid a high compliment.—Mr. Pomeroy gracefully responded.—The "Mayor and Corporation of Neath," was ably given by Mr. J. S. Church, and responded to by the Mayor, the Town Clerk (Mr. E. C. Curtis), and Mr. Markham.—Mr. Venables next gave "The Town and Trade," to which the Mayor and Mr. Pomeroy responded.—The toast of the evening, viz., "Success to the Associated Society of Loco. Engineers and Firemen," was proposed by Mr. C. Hedge, who said the Society was in a prosperous condition, and conducted on such a basis as would, undoubtedly, confer great benefit on its members. Mr. Thomas Andrew responded, stating that the Society had now been established eight years. It was started, not with a view to defying anyone, but with the object of securing fair play between capital and labour, and to confer, by means of a sick benefit society and a superannuation fund, certain material benefits upon its members. They had now a capital of over £8,000.- "Success to the Steam Enginemen and Firemen's Benefit Society" was proposed by Mr. Tom Church, and effectively responded to by Mr. C. Hedge.—The toast list concluded with "The G.W.R. Mechanics," which was proposed by Mr. Ed. Williams and responded to by Mr. Hofield. During a very pleasant evening songs were capitally rendered by Messrs. Lewis Arnold, Evan Davies, Venables, Sullivan, and others; accompanied by Mr. J. S. Church.

BRISTOL BRANCH.

SIR,—I am glad to say that we made two new members at our last meeting, making six for the quarter. We have also four others promised to join us next club night. Yours truly,

T. M., SEC.

KING'S CROSS BRANCH.

SIR,—I beg to inform you that our monthly meeting was held on Sunday, May 6th, and was very well attended. Correspondence from the General Office respecting the defence the Society rendered to Brothers Taylor and Davis, *re* Hexthorpe. The active part our Society took in this case gave great satisfaction to our members, and has dismissed a great many erroneous statements which are being circulated amongst our members. The proof of the active part taken by our General Secretary was received with applause. An appeal from the Chairman to those who were not members resulted in four being enrolled. Yours truly,

F. GREEN, SEC.

BRANCH MEETING HOUSES.

SHEFFIELD.
Albion Hill, Johnson Street, Wicker. Alternate Sundays.

PONTYPOOL.
Hanbury Hotel, Griffiths Town, Newport, Mon.

NEATH.
Three Cranes Inn, Wind Street, Neath. Alternate Sundays, 7.30 p.m.

LEEDS.
Prince of Wales Hotel, Mill Hill. Last Monday in month.

LIVERPOOL.
American Tavern, Byrles Street, off Park Road, Toxteth Park. Held fortnightly.

BRADFORD.
Granby Hotel, Union Street. First Sunday in month.

LLANELLY.
Neptune Hotel, New Dock, Llanelly.

SANDHILLS.
Brown Cow, Walton on the Hill. Alternate Sundays.

SWANSEA.
Monthly—Landore Coffee Tavern. Saturday, at 8.30 p.m.
Quarterly—Drum's Coffee Tavern, Wind Street, Swansea.

EXETER.
New Market Inn, Goldsmith Street, Exeter.

NOTTINGHAM.
Mission Room, Queen's Walk, Nottingham. Every Monday at 8 p.m.

BRISTOL.
Phœnix Hotel, Totterdown. Every fourth Sunday at 7 p.m.

PLYMOUTH.
At Mr. Sleeman's, 31, Hortwell Street. Last Sunday in Quarter at 6.30 p.m.

YORK.
Adelphi Hotel, Railway Street, York. Alternate Sundays at 8 p.m.

PADDINGTON.
Builders' Arms, Westbourne Park, London. Every third Sunday.

NEWPORT.
New Bridge Inn, Bridge Street. Alternate Sundays, from May 6th.

OPENSHAW.
Drovers' Arms, Ashton Road, Openshaw. Alternate Sundays at 7.30 p.m.

KING'S CROSS.
The City of London, York Road, Cattle Market, London. Monthly.

BIRMINGHAM.
Small Heath Hotel, Coventry Road. Alternate Sundays.

BATTERSEA.
The Two Brothers, New Road, Battersea.

RETFORD.
Oddfellows' Arms, London Road, South Retford. Monthly at 8 p.m.

LINCOLN.
Arcade Coffee Tavern, Lincoln. Last Sunday in the month.

STRATFORD.
Railway Inn, Angel Place, Stratford, London.

WOLVERHAMPTON.
Gladstone Inn, North Road, Wolverhampton. Meetings held monthly.

GRIMSBY.
Friendly Society Hall, Lower Spring Street. Alternate Sundays at 10 a.m.

BIRKENHEAD.
Borough Hotel, Birkenhead. Alternate Sundays.

READING.
Blagrave Arms, Blagrave Road, Reading. Meetings fortnightly.

BLACKBURN.
Dolphin Hotel, Blackburn.

Branch Secretaries are requested to forward us the names of their meeting houses.

* * *

HONORARY MEMBERS ADMITTED IN 1888.

MESSRS. TIPPETTS & SONS, Solicitors,
Maiden Lane, London, E.C.

MR. A. MAXWELL,
Duke of Clarence,
St. Pancras Road, London.

MR. L. BEAUMONT,
Adelphi Hotel, Railway St., York.

THOMAS LOUGH, ESQ.,
5, Newton Grove,
Bedford Park, Chiswick.

MR. F. WARD,
King's Cross, London.

MR. G. F. BROACH,
City of London,
York Road, London.

* * *

LIST OF BRANCHES.

We have now branches at the following places:—

Sheffield
Neath
Plymouth
Exeter
Oxford
Leeds
Cardiff
Battersea
Bow
Lincoln
Wolverh'ton
Skipton
Retford
Birkenhead
Carnforth
York
Llanelly
Mexborough
Nottingham
Reading
Newport
Kentish Town
Paddington
Pontypool
Toton
Sandhills
Manchester
Swansea
Liverpool
Bristol
Grimsby
Gloucester
Birmingham
King's Cross
Stratford
Peterboro'
Bradford
Openshaw
Stockport
Blackburn

Obituary.

KING'S CROSS BRANCH.

Sir,—It is with profound regret that I have to record the death of Thomas Patrick, a member of the Branch, whose death took place on the 3rd inst, after a short and painful illness. We shall all miss a well known face, as many will remember the active part he played to raise the position of enginemen and firemen. His labours on behalf of his fellow workmen will be fresh in the memory of the pioneers of the ten hour movement, the late Mr. Thomas Patrick being the Kings' Cross Representative at the conference in 1866. The inflexible integrity of his character, and the social and domestic virtues which adorned his private life will long be cherished in the recollection of all those that knew him.

Yours truly, SEC.

We regret having to record the death of Brother John Wotton, of the Plymouth Branch, who departed this life on Monday, April 30th, 1888, aged 39 years, after the short illness of two days, leaving a widow and five children. He was formerly an engine driver in the service of the Great Western Railway Company.

LOCOMOTIVE ENGINEERS AND FIREMEN'S

Monthly Journal.

"This that they call Organization of Labour is the universal vital problem of the world. It is the problem of the whole future for all who will in future pretend to govern men."—THOMAS CARLYLE.

"I know no better definition of the rights of man :—Thou shalt not steal; Thou shalt not be stolen from; what a society were that—PLATO'S REPUBLIC, MORE'S UTOPIA, *mere emblems of it! Give every man what is his—the accurate price of what he has done and been—no more shall any complain, neither shall the earth suffer any more."*—THOMAS CARLYLE.

VOL. 1. JUNE, 1888. No. 5.

ACCIDENTS TO PASSENGERS AND SERVANTS ON RAILWAYS IN THE UNITED KINGDOM IN 1887.

THE returns of accidents and casualties, as reported to the Board of Trade by the several Railway Companies for the year ending 31st December, 1887, have been issued.

From these returns it appears that the total number of persons killed on railways during the year was 919, and that 3,590 were injured. Of those killed 121 were passengers, 422 were railway servants, and 376 were persons other than the foregoing, killed at level crossings, trespassers, suicides, &c. Of the injured, 1,279 were passengers, 2,075 railway servants, and 218 other persons injured at level crossings and whilst trespassing.

The accidents to passengers are classified as follows :—

	Killed.	Injured.
From accidents to trains, rolling stock, permanent way, &c.	25	538
From falling between trains and platforms	19	61
From falling on to platforms, ballast, &c., when getting into or out of trains... ...	14	523
Whilst crossing the line at stations	37	20
By the closing of carriage doors	—	72
From falling out of carriages during the travelling of trains...	2	23
By other accidents	24	60

The accidents to the 2,497 railway servants during the year occurred in the following ways :—

	Killed.	Injured.
From accidents to trains, rolling stock, permanent way, &c.	8	109
Whilst coupling or uncoupling vehicles	26	232
By coming in contact whilst riding on vehicles during shunting with other vehicles, &c., standing on adjacent lines	4	29
Whilst passing over or standing upon buffers during shunting	—	16
When getting on or off, or falling off engines, waggons, &c., during shunting ...	20	135
Whilst braking, spragging, or chocking wheels	7	123
Whilst attending to ground points, marshalling trains, &c.	14	75
Whilst moving vehicles by capstans, turntables, props, &c., during shunting ...	8	187

	Killed.	Injured.
By other shunting accidents not included above... ...	36	355
By falling off engines, &c., during the travelling of trains	19	76
By coming in contact with overbridges, or erections on the sides of the lines during the travelling of trains ...	8	25
Whilst attending to, or by the failure of machinery, &c., of engines in steam... ...	6	148
When getting on or off engines, vans, &c., during the travelling of trains	13	116
Whilst working on the permanent way, sidings, &c....	99	97
Whilst attending to gates at level crossings	3	2
Whilst walking, crossing, or standing on the line on duty	93	127
From being caught between vehicles	9	55
From falling, or being caught between trains and platforms, walls, &c.	5	33
Whilst walking, &c., along the line on the way home or to work	37	36
Miscellaneous	7	99

Sixty-three other persons were killed, and 30 injured whilst passing over level crossings. 203 trespassers were killed and 114 injured. 70 persons selected violent contact with railway trains as a means of shuffling off their mortal coils, with complete success, whilst 40 other persons were killed and 69 injured in a variety of ways not enumerated above.

In addition to this list, there were killed and injured during the year upon the Companies' premises, by accidents in which the movement of railway vehicles proper was not concerned, the following number of persons :—

	Killed.	Injured.
Passengers	5	294
Railway servants ...	34	3,703
Persons on business at Stations, &c.	19	160

The return, as compared with that for the year 1886, shows a decrease of 19 in the total number of the killed, and an increase of 51 in the number of those injured.

Of the classes of railway servants who met with fatal accidents, 42 were brakesmen and goods guards, 21 were engine-drivers, 25 were firemen, 27 were labourers, 106 were permanent way men, 54 were porters, and 27 were shunters, whilst there were injured 337 brakesmen and goods guards, 185 engine-drivers, 221 firemen, 119 permanent way men, 309 porters, and 292 shunters.

The return, on the whole, will compare favourably with that of most other countries, but still we think that something more might still be done by the Railway Companies to render the employment of their men more safe.

Scientific.

LOCOMOTIVE PERFORMANCE.

The discussion on the comparative merits of single and coupled locomotives now going on in our correspondence columns may easily become valuable and interesting ; but to secure this desirable end it is essential that those taking part in it should keep strictly to facts, and avoid putting forward opinions as things which are demonstrably certain. The fitness of a South-Western engine for Great Northern work, or the adaptability of a Great Northern engine for South-Western service, can only be regarded as a legitimate subject of discussion with limitations. As the South-Western engines are coupled and the Great Northern are not, each may be taken as a type. But it is as types that they are best treated, our readers always bearing in mind two prominent facts—first, that no one can possibly know as well what class of engine is best suited for his railway as the locomotive superintendent of the line ; and secondly, that single engines are not confined to the

Great Northern Railway, nor coupled engines to the South-Western.

Of all the barren subjects it is possible to bring into a controversy on locomotive construction, none is more barren than the consumption of coal per mile. As a rule, outsiders know accurately practically nothing at all about it. Furthermore, the locomotive superintendent himself can form little more than a good estimate. It is very easy to ascertain how much coal a locomotive burns in running, say, from London to Grantham, with a given train, but this means nothing in a railway sense. We have met with instances in which the consumption on a trip was under 18lb. per mile; but the whole class of engines on the same work was debited in the coal sheets with over 30lb. a mile. Allowances have to be made for lighting-up, for standing, for shunting, and so on; and nearly as much coal may be, so to speak, wasted in this way as is actually utilised. An express engine may work for five hours out of the twenty-four, steam being kept up for seventeen hours while the engine is standing. On the other hand, a locomotive may work for nineteen hours out of the twenty-four. Again, the mileage of an engine is, taken alone, no test of its economy. It may mean anything or nothing. We have to consider not only the mileage, but the speed and the load. But perhaps the most important source of error of all, is neglect of the quality of the coal. On the North Eastern Railway, for example, coal is used pretty nearly as it comes from the colliery. There is a large proportion of small, slack, and dirt in it, and its price will probably be 7s. 6d. per ton, or even less. The Great-Western, if we are not mistaken, once bought 25,000 tons of good coal at 5s. 6d. When we go south of the Thames, all the conditions are changed. The London, Brighton, and South Coast Company at one time paid as much as 19s. a ton for Welsh coal. It does not pay, when carriage becomes a serious item, to buy cheap coal. In drawing a comparison, therefore, between the performances of an engine working in the south, and one working in the north, the relative merits of the coal used must not for a moment be lost sight of. Furthermore, our correspondents do not attach anything like sufficient importance to the influence of speed. They forget that for any given velocity the consumption of fuel will be augmented in the ratio of the square of the speed. Thus, for example, if an engine runs at sixty miles an hour, it must exert four times the horse-power needed to run at thirty miles an hour with the same load, and the consumption per mile will be doubled from this cause alone. We may add that in practice the fuel bill will be augmented much more than this, for reasons which will be readily understood by engineers.

Whether a single or a coupled engine will best conduct a given traffic is, after all, a much more simple matter than some of our readers appear to think. It is a question which turns on the load that can be put on the driving-wheels and the gross tractive force. It appears that so long as the maximum hauling effort of a locomotive does not exceed 4 tons, single driving wheels will answer well. If the pull exceeds 4 tons, then the wheels should be coupled. If we have two engines of the same principal dimensions, the one coupled, the other not. they will both be able to haul the same weight at the same speed on the same consumption of fuel. There is no earthly reason why a Great Northern single engine, with 7ft. wheels should not haul a South-Western train just as well as a South-Western engine with 7ft. wheels and similar cylinders; and the South-Western coupled engine would, no doubt, conduct the Great Northern traffic, now worked with 7ft. engines, just as well as the Great Northern engines, always provided, of course, that the adhesion was sufficient in both cases, and the boiler power the same. The whole point really is this —Can a single engine be trusted to do heavy pulling on an incline in English weather? and we think the answer is that it can, provided sand be properly used. There is a certain small increase of friction entailed by the use of coupling rods, which may be set against the loss of fuel caused when a single engine slips. For the rest we have to do with the question of repairs more than anything else. Will the wear and tear of a single engine be greater than that of a coupled engine? No one can answer this save a locomotive superintendent who has carefully studied the question; we have seen figures that would prove either proposition, We can name single engines, conducting very nearly the same traffic as coupled engines, and the locomotive superintendent of the line has no sufficient data to enable him to decide which class is least costly. In some cases the coupled engines cost most; in others, again, the broken crank shafts and worn tires of the single engine are heavy items of expense. This much may, we think, be conceded; the best results are got in single engines with outside cylinders; and in coupled engines with inside cylinders. When an engine with single drivers slips and sand is applied, it reaches one wheel probably before the other, and away goes the crank shaft; but a broken straight axle from this cause is a rare event. We have no doubt that one of the principal causes contributing to the success of Mr. Stirling's 8ft. wheel engines is the use of outside cylinders. In drawing comparisons, it is well to bear in mind that what is eminently good for a fast train is not necessarily the best for a slower train. It is therefore not quite to the point to compare Great Northern with South-Western engines. On the latter line the speeds are slow. But they are not fixed by Mr. Adams, who has to design his engines to satisfy the demands of the traffic manager. Mr. Stirling, on the other hand, has to run the quickest trains in the world, and he builds accordingly. Mr. Adams' success on one line does not prevent Mr. Stirling being just as successful on another line with a totally different class of engine.

The point which really deserves and demands discussion, is that which we raised a few weeks ago, concerning single and coupled engines, and it may be worth while to state it again. A given line has maximum gradients of 1 in 250, and its express trains weigh empty 130 tons, exclusive of engine and tender. The average speeds, including stops, are forty-four miles an hour. Should such traffic be worked with single or coupled engines, bearing in mind the impediments caused by an English winter?—*The Engineer.*

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ARE SAFES SAFE?

Some people who know of the wonderful contrivances invented of late years for the perfecting of burglar and fire-proof safes, may laugh at any question which throws doubt upon the absolute security of their patent deed-boxes and bond depositories against all evil disposed persons, and against the damaging effects of fire, air, or water. But Mr. Thomas Fletcher, F.C.S., of Warrington, has arisen to disturb our tranquillity in this respect, and plainly tells us, "Put not your trust in steel-plates, nor intricate ward-within-ward locks." This gentleman has invented, in short, a gas heating appliance with which, and a small blow pipe, he can in a few minutes and noiselessly fuse a hole in any iron or steel door in existence; and, worse and worse, the apparatus can be made so light and small as to be easily carried in a hand bag, taken up a ladder, and used in any position. Of the inventor's putting his ingenious contrivance wrongfully to work there is no reason to be afraid, but burglars are quick to wrest science from legitimate to illegitimate uses, and safe and strong-room makers must now lay their heads together and find that, more powerful than chilled iron or steel, which will resist this their latest and most terrible enemy.

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THE PERSPIRATION.

The result of elaborate research made by Peiper yields the following conclusion: The perspiration is more concentrated on the right side of the body; this observation is in accordance with that of Reinhardt; it would be interesting to know whether the opposite was the case in the left-handed. The palm of the hand sweats four times more than the skin of the chest, and the cheeks one and a half times as much. There is a slow increase in the sweat in the afternoon, especially obvious from eight to twelve o'clock at night. After midnight there is a diminution. Feeding has but little influence on this function. Elevation of the surrounding temperature increases the perspiration, and variations of the hygrometric state of the atmosphere have an immense influence on the function. The quantity of water evaporated in a quarter of an hour from a cutaneous surface twenty-five centimetres square, in a normal individual, is about 1·76 of a gramme. In infants the quantity is generally less than in adults. The weight of the body and sex have no marked influence on the perspiration.

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THE MANCHESTER BOULDER.

At the spring soirée of the Scientific Students' Association, held recently at the Memorial Hall, Professor W. C. Williamson, who presided, delivered a short lecture on boulders, with special reference to the boulder recently discovered in Oxford Road. That particular boulder, Professor Williamson said, was larger than any he had ever seen. He did not favour the theory that the boulder was brought to the position in which it was found by the action of fresh water. It was scarcely possible to conceive any torrent capable of moving it. He attributed the presense of the stone in Oxford Road to glacial action. We could trace the rock of which the boulder consists back to the Lake District, which abounds in volcanic products. There were in a great many localities, both in Scotland and in England, volcanoes of various geographical ages, which had poured out their lava in immense quantities. In the Lake District there were to be found many varieties of lava, to which were applied the general name of basalt. The boulder was a fragment of one of those ancient, consolidated lavas. It was transported from the Lake District by means of an iceberg, which gradually melted as it came floating down until at last the stone got free from it and dropped down at Oxford Road, where it had now been found. There it had remained for hundreds of thousands of years, until it had been found by the servants of the Manchester Corporation. He considered the stone to be one of the finest examples of a boulder stone that England can show.

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LOCOMOTIVE FIRE-GRATE SURFACES.

Much is said concerning the quantity of fuel burned per square foot of grate surface per hour—so much that the thing has acquired a spurious importance. So far as the grate itself is concerned, it matters very little whether we burn 10 lb. per square foot per hour or 100 lb.; the question of real interest is the rate of combustion which gives the best results in economy or efficiency or in both; and it fortunately happens that both the one or the other remains unaffected through wide variations in the dimensions of the grates. That is to say, whether we burn 10 lb. per square foot per hour or 50 lb., an equally good evaporation can be obtained, measured in terms of pounds of water boiled away by every pound of coal burned. A grate is neither more nor less than an appliance for supporting fuel and permitting air to get access to it for the purpose of combustion. The area of air space available varies with the dimensions and number of the bars, but it is usually about one-third of the whole surface; that is to say, there will be about one-third of a square foot of opening for the ingress of air per square foot of grate. Assuming that 18 lb. of air are required for the combustion of 1 lb. of coal, and taking 13 cubic feet to weigh 1 lb., we have 18 × 13 = 234 cubic feet as the volume required per pound of coal per hour. If 10 lb. are burnt, then the volume will be 2,340 cubic feet, and as this has to pass through orifices equivalent to one-third of a square foot in area, it follows that the velocity of influx of the air must be 2,340 × 3, or 7,020 ft. per hour, or 117 ft. per minute—a very moderate velocity. If we augment the quantity burned to 50 lb. per square foot per hour, then the whole quantity of air needed will be 2,340 × 5 = 11,700; and the velocity of influx becomes 585 ft. per minute. The total heat evolved by the coal will be the same in either case, and the temperature would be the same also, were it not that the furnace being relatively smaller when most coal is burned, the heat is more concentrated. So far as the process of combustion is concerned, however, one system is just as economical as the other. There are, however, conditions outside combustion which affect the result. More power is expended in imparting the additional velocity to the air necessary when the larger quantity of fuel per square foot is burned. This power is obtained either by an extra temperature, augmented height of chimney, or by a fan, or by a blast pipe as in a locomotive. There is a further loss caused by the carrying away half burned of much of the coal by the violent rush of air through the furnace to the flues. On the whole, therefore, it may be taken for granted that the quantity of fuel burned per square foot of grate per hour should be kept within reasonable limits; probably 40 lb. is about the most that is consistent with high economy, and this only with boilers which have a very large heating surface in proportion to the grate, as in locomotives. Marine boilers, which have much larger and shorter flue tubes, cannot burn anything like 40 lb. without an enormous waste of heat up the chimney; 25 lb. per square foot per hour is probably the maximum for this type of generator.

Bearing these facts in mind, there is some reason to think that, as a rule, grates are too small, and that economy would be secured by augmenting their dimensions. But this is not always possible, for more reasons than one. When a grate exceeds a certain size it is difficult to keep the bars properly covered with fuel. The fire must be thin, or too much steam will be made. This, however, can be prevented by dropping the damper; but in that case there is always a probability that combustion will be imperfect and much smoke made. It is not, however, so much with land stationary boilers or marine boilers that we wish to deal as with locomotives. Both on land and at sea the dimensions of grates can be made to comply with the demands made on the boiler in a way that is difficult in the case of a locomotive.

In the present day express trains are run just as fast as the engine can take them, and if one engine will not suffice, two are put on. The limit of power is determined by the boiler, but that in its turn is measured by the size of the grate, or in other words, that of the fire-box. And the question which we wish to submit to our readers is this. Is it essential that a big boiler should be used to do a given amount of work, or can the same result be got by using a small boiler by comparison and a big fire-box? To make our meaning clear, let us suppose that a locomotive superintendent uses engines with 17 in. cylinders, 2 ft. stroke, and 7 ft. wheels. There are 900 square feet of tubes and 117 of fire-box and 18 square feet of grate. Wanting more power, he builds engines with 18 in. cylinders, 26 in. stroke, and 7 ft. wheels. Must he have a new type of boiler with, say, 1,050 square feet of tubes, 19 square feet of grate, and 125 square feet of fire-box, or will he get all the steam he needs by augmenting his grate, say, to 21 square feet, and his fire-box to 150 square feet? The latter expedient will, of course, be the cheaper of the two, and will give a lighter engine. Of course it will be understood that the dimensions we have given possess no special virtue; they have been taken at haphazard to illustrate our question. Now we think the answer to this question must be in the affirmative. In many cases the steaming powers of boilers have been greatly improved without any perceptible sacrifice of economy by augmenting the grate area—and, of course, with it that of the fire-box—alone, the barrel of the boiler and the tubes remaining unaltered. More coal per fire-box can be burned per mile or per hour, but the temperature is not raised in proportion; on the contrary, it is rather reduced, and the tubes are therefore more more efficient than it would appear at first sight that they could be. In Belgium enormous grates are used to burn poor coal. But this is necessary only because this coal will not burn if there is a thick layer of it on the bars. We venture to assert that something—perhaps a great deal—could be gained if locomotive superintendents in this country augmented the dimensions of the grate where possible. Blast pipe orifices became enlarged very soon after coal burning became common, and back-pressures were reduced with marked advantage in consequence. The reason is that all the air required for combustion is no longer dragged violently head and shoulders, so to speak, through the grate. A very large proportion of it is admitted through the fire-door. If this was not the case we do not believe it would be possible for some of our fast express engines with heavy trains behind them to keep time; either they would be short of steam, or the exhaust nozzles must be so contracted as to produce heavy back-pressure. . . . . . It is well known that splendid work is being done in America with engines with huge grates—splendid, that is to say, as far as the provision of abundance of steam is concerned. All the indications available are that, within reasonable limits, of course, the bigger the grate in a locomotive the better, because the rate of combustion per foot is now faster than it should be. We know perfectly well that considerable difficulties stand in the way, and prevent or restrain the locomotive builder, but after making every allowance for this, we must continue to hold that grates and fire-boxes might in a great many cases be larger than they are now; and we feel certain that a step must be made in this direction if express trains are to go on increasing in weight and speed. A big fire-box is the cheapest possible expedient for augmenting boiler power.—*The Engineer.*

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Common salt is the most widely distributed substance in the body; it exists in every fluid and every solid; and not only is everywhere present, but in almost every part it constitutes the largest portion of the ash when any tissue is burnt. In particular it is a constant constituent of the blood, and it maintains in it a proportion that is almost wholly independent of the quantity that is consumed with the food. The blood will take up so much and no more, however much we may take with our food; and, on the other hand, if none be given, the blood parts with its natural quantity slowly and unwillingly. Under ordinary circumstances, a healthy man loses daily about twelve grains by one channel or the other, and if he is to maintain his health, that quantity is to be introduced. Common salt is of immense importance in the processes ministering to the nutrition of the body, for not only is it the gastric juice, and essential for the formation of bile, and may hence be reasonably regarded as of high value in digestion, but it is an important agent in promoting the processes of diffusion and therefore of absorption.

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HOW LITHOGRAPHY WAS DISCOVERED.

After the first truimphant performance of Mozart's opera, "Don Juan," at Munich, the theatre was deserted by all except one man. Alois Sennefelder had still much to do. After seeing around the stage that no sparks had ignited, he retired to his room to stamp the theatre tickets for the following day. As he entered the room he had three things in his hand—a polished whetstone for razors, a ticket stamp moistened with printers' ink, and a cheque on the theatre treasury for his weekly pay. He placed the cheque on the table, when a gust of wind took it, swept it high up in his room, and then deposited it in a basin filled with water. Sennefelder took the wet paper, dried it as well as he could, and then, to make sure of it, weighted it down with the wet whetstone, on which he had before carelessly placed the printing-stamp. Returning to his room on the following morning, he was surprised to see the letters of the stamp printed with remarkable accuracy upon the damp paper. He gazed long at the cheque; a sudden thought flashed through his brain; he wondered if by some such means he could not save himself the weary trouble he continually had of copying the songs of the chorus. That very morning he went out and purchased a larger stone, and commenced to make experiments, and finally succeeding in discovering the art of printing from stone—lithography.

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PERSPIRATION OF PLANTS.

All plants give off moisture from their leaves, even though this is invisible to the eye, just as the human skin is always perspiring, though the sweat may not stand in drops. Calculations have been made as to the amount of water thus perspired by plants. A sunflower, only three and a half feet high, with 5,616 square inches of surface exposed to the air, gives off, every twelve hours, twenty to thirty ounces avoirdupois of water in this form, which is as much as a man does. Most of the common agricultural plants, such as wheat, beans, peas, and clover, exhale, during the five months of growth, more than two hundred times their dry weight of water. The Cornelian cherry is still more remarkable. In the course of twenty-four hours it exhales water equal in weight to twice that of the whole shrub. Naturally, the degree of light, warmth, and dryness of the air affects the amount of fluid given off, as well as the age and texture of the leaf. However, a calculation of the amount of fluid perspired by an acre of cabbages may be curious. If the cabbages are planted in rows of 18 inches apart, and 18 inches from each other, it is estimated that in the course of twelve hours no less than 10 tons 4 cwts. 3 qrs. and 11 lbs. weight of water will have been insensibly perspired by their fleshy leaves.

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INDIA seems to be taking the initiative in introducing iron cars. Cars of this material are said to give entire satisfaction in service. Contracts were recently closed for the construction of 60 iron box cars and ten flat cars of the same material. All these cars are to be 25 feet long, and will be built in the American style, with centre-bearing trucks and centre coupling. The frames will be made with channel-bar steel, and the transoms of the trucks will be steel. The floor, sides, and roof of the cars are made of sheet iron riveted to angle iron.

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THE OCEAN.

A uniform feature of the ocean is the saltness of the water. It holds in solution chloride of sodium (common salt), a small quantity of the sulphate of magnesium, sulphate and carbonate of lime, iodine and bromide of magnesium. These form about one-thirtieth of the water by weight. In every pint of sea water there is an ounce of salt. If the waters of the Atlantic Ocean were to evaporate there would remain a deposit of salt sufficient to cover 7,000,000 of square miles to the depth of one mile. A gigantic salt-box, indeed! Was the water of the sea ever pure! Certainly not. The rivers that flow into it are not pure. They are fed by springs and the rain, which wash everything soluble, salts and minerals, into them. These are all carted down and dumped into the ocean. Vapour, moreover, is constantly rising from every part of the ocean in great masses, especially under the tropics. The salts brought into the sea sink, so that by this process of evaporation it becomes salt. There may be also great masses of salt rock on the sea bottom, like that about the Dead Sea, that is constantly dissolving. All the causes of the saltness of the ocean are not known. It may have been created salt.

The water is of uniform saltness, although we come now and then upon places where the salt predominates. But this is due, beyond doubt, to local causes. Though inland seas are, as a rule, less salt, yet the Mediterranean holds in solution more salt than the ocean itself; while the Red Sea, under the intense heat and the immense evaporation going on, is growing constantly salter. Some of these ages it will form a strong pickle.

Sea water, inclosed in a bottle, is colourless. When looked at in a mass it seems a peculiar green; when viewed from a distance it is blue—"The blue, blue sea." In the tropics and some parts of the Mediterranean, along the eastern shore, it is indigo blue. In other places it is a deep green; in still others a slate gray. "Fickle as the sea," is true of its colour, as of the changes on its surface. In some places the water is black; in others, white or beautifully transparent. In the fiords, off the coast of Norway, the water is marvellously clear and transparent. At the depth of twenty-five fathoms the smallest object can be seen on the sandy bottom. The water magnifies as the lenses of a miscroscope. According to one writer, the polar oceans are a very beautiful blue, while in the Bay of Naples the rays of the sun, falling upon the water, causes it to sparkle as flakes of of silver. The Black Sea derives its name from the storms and tempests that sweep over it, while the White Sea gets its name from great masses of floating ice.

IGNORANCE ABOUT BOILERS.

The facts which might be brought out by a well-directed examination of the persons in charge of steam boilers in some sections of the country would be amusing, were it not for the fact that a steam boiler in charge of a *too* ignorant person is always an element of great danger. Not long since a boiler exploded in one of our cities, and as such a thing had not occurred in that vicinity for some time, people were somewhat stirred up over the matter, and an examination of the engineers and boilers was of course in order. The following are some of the incidents reported as a result of the examination:—In one place a pile of ashes about four feet high was found banked up against the side of a boiler. The engineer was asked why they were there, and he replied that "the boiler was sweating a little," and that he had put them there to keep the water from coming out of it. The ashes were immediately removed, and four or five holes were found in the boiler through which the water was oozing. The boiler was under a pressure of sixty pounds at the time. Over thirty people were employed in the immediate vicinity of the boiler. Some ludicrous answers were made by candidates for engineers' licences. For instance, one candidate when asked the dimensions of the boiler he was running, replied, "two and one-half feet high, one foot in diameter, and 120 one and one-half inch tubes in it." It was afterwards ascertained that the boiler was 48 inches in diameter and 11 feet long. No licence was given in this case. Another applicant averred that the boiler he was running "was 24 feet high, 8 inches in diameter, and had a three-foot square grate under it." The boiler proved to be about 10 feet high and 40 inches in diameter. In one place where there was a battery of five boilers the steam-gauges were found indicating all the way from 38 to 100 pounds, when the pressure on the boiler was about 80 pounds. Many other instances of gross ignorance and neglect might be cited, but the above are sufficient to show the alarming state of affairs which prevails in some places.—*The Locomotive.*

TO REMOVE STAINS FROM BOOKS.

Nearly all the acids remove spots of ink from paper, but it is important to use such as attack its texture the least. Spirits of salts, diluted into five or six times the quantity of water, may be applied with success upon the spot, and after a minute or two washing it off with clear water. A solution of oxalic acid, citric acid, or tartaric acid is attended with the least risk, and may be applied upon the paper and plates without fear of damage. These acids, taking out writing ink, and not touching the printing, can be used for restoring books where the margins have been written upon, without attacking the text. When the paper is disfigured with stains of iron, it may be perfectly restored by applying a sulphuret of potash, and afterwards one of oxalic acid. The sulphuret extracts from the iron part of its oxygen, and renders it soluble in diluted acids. The most simple but at the same time very effectual method of raising spots of grease, wax, oil, and any other fat substance is by washing the part with ether, and placing it between white blotting-paper. Then, with a hot iron, press above the part stained, and the defect will be speedily removed. In many cases, where the stains are not bad, rectified spirits of wine will be found to answer the purpose.

THE TELEPHONE SUPERSEDED.

A NEW MARVEL.

Professor Elisha Gray, of Highland Park, Illinois, by the invention of the new apparatus, to which he has given the name of the telautograph, has gone a long way towards displacing the telephone. By means of this instrument a person may sit down in his office, take a pencil in his hand, write a message, and as the pencil moves, a pencil in his correspondent's office will move simultaneously, and form the same letters and words in the same way. What is written in one place is instantly reproduced elsewhere. Any language may be employed. The writer may use shorthand, he may write by code or in cypher; it does not matter, a facsimile is reproduced. If a picture is to be "wired" it is the same, a perfect copy appears at the other end of the wire. In writing, the pencil or pen is attached to two small wires, and these wires regulate the currents which control the pencil at the other end of the wire. But these wires give no trouble, and one can write with as much facility as if they were absent. The telautograph is stated to work much more perfectly than the telephone.

Miscellaneous.

THE KIND OF WIVES NOW WANTED.

The spread of Radical notions is nowhere seen more than in the change of opinion that has come over young men of to-day in the matter of marriage and the qualities sought for in a wife. As a writer in *The Westminster Review* puts it: "A man nowadays wants something more than a good housewife and mother of his children. Time was when, the education of men generally being very indifferent, they were not particularly sensible of any great deficiency of education in their spouses, and were content when her erudition extended no deeper than her prayer-book and a receipt-book—which seems to have been its extent, according to Macaulay, in the latter half of the seventeenth century. But with the progress of education and learning comes a longing for a companion, and for one whose face does not assume a blank appearance when anything more subtle than baby-clothes forms the subject of conversation. A man now is not likely to be so easily satisfied as was that Prince of whom Montaigne tells us, who, on being told that the lady he was about to marry was not very learned, replied: 'That he liked her all the better for it, and that a woman was learned enough if she knew the difference between her husband's shirt and his doublet.' Now such knowledge, though desirable, not to say necessary, in the wife of one's bosom, would hardly suffice to make a very intelligent companion. One of the most important results, however, that will accrue to society from the further extension of higher education of women, will be the beneficial effect it will have over the character of the children borne by such cultured women. If there is one law in Nature more certain than another, it is that the mental, no less than the bodily, characteristics are transmitted to the offspring. This being so, it is, to say the least, advisable that our future mothers, as well as the fathers, should have as much culture and education as is attainable without injury to health. Had the higher education been in vogue when Goethe lived, perhaps he had married some other woman than his servant, and his son might have been another, possibly a better Goethe, instead of being so deficient in intellectual capacity that his father always spoke of him, with grimly sarcastic truth, as 'the servant-girl's son.' It is quite probable, as Mr. Spencer very properly points out, that Edwin is not, as a rule, brought to Angelina's feet by her German. But surely it is as equally true that, unless Edwin is an absolute idiot, the knowledge that Angelina can whisper soft nothings in his ear in that learned but slightly guttural language will not be a very fatal obstacle to his declaration. Rosy cheeks, laughing eyes, and a finely-rounded form are, no doubt, great attractions, and very desirable. But if one's wife has only these physical attractions, without a corresponding mental development, she may prove a very good nursemaid, but not a very intelligent helpmeet."

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RECKONING TIME.

A very little thought upon the matter will show that if the earth makes one revolution in the course of twenty four hours, the sun will rise at any particular place earlier or later, according as the place is farther east or west. As all the distance round the globe is three hundred and sixty degrees, and as all this passes under the sun in twenty-four hours, it follows that the distance passing in one hour will be fifteen degrees. We more commonly speak of the sun passing over that number of degrees in an hour, for that is what seems to be done. This gives a rate of motion of one degree in four minutes.

As this rate is uniform, it is a simple matter to convert time into distance, or distance into time. This is just what the navigator does in calculating his longitude —his distance east or west from some given meridian line.

Suppose the meridian of London be taken as the prime meridian from which to reckon. If a ship leave London and sail towards the west, when it has sailed one degree it will have reached a line upon which the sun rises four minutes later than it rises at London. Of course, the time will be four minutes later all the day.

If, now, the captain of the ship have with him a chronometer set to London time, and regulated so as not to vary for change of temperature or other cause, this chronometer will be four minutes faster than the true time at the place where he is. The true time he finds by observing when the sun crosses at noon the north and south line running directly overhead.

The chronometer shows the captain London time; he finds the time where he is by observation of the sun every noon when it is not cloudy. Every four minutes of difference counts for one degree of longitude.

If he kept on in this way until he had sailed around the globe, which is a distance of three hundred and sixty degrees, he would lose just twenty-four hours. His chronometer would again agree with the sun, but his calendar would be at fault. The day of the month and the day of the week, if he had made no change, would require dating forward by just one day; that is, if his record showed that it was Tuesday, April 15th, it would actually be Wednesday, April 16th.

To keep as near the true date as possible, the change is always made when the ship has completed half the circuit of the globe —having made one hundred and eighty degrees of longitude. At that point the chronometer will be just twelve hours ahead of local time, half-a-day as fast as the calendar stands.

But the calendar is now set ahead one whole day, thus making the chronometer slow by twelve hours in comparison with local time. If from this point the ship continues her voyage around the world, it will be gaining at the same rate, and come to London on the right minute, hour, day of the week, and day of the month.

Few vessels make the complete circuit of the globe, but it is the practice of all to change the date when they cross the meridian of one hundred and eighty degrees.

By following this rule all records made on the voyage will bear the proper date. Of course, when they cross from west to east the change is made by dropping out a day, or setting the date back.

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SNEEZING AND SHIVERING.

According to the *Lancet* nature's provision against the consequence of a "chill," and for the prevention of a "cold," are sneezing and shivering. A violent fit of sneezing often saves a chilled body the consequences of the nerve depression or "shock" to which it has been subjected, and this shock may in its first impression be very limited in its area; for example, the small extent covered by a draught of cold air rushing through the crevice of a door or window. The nerve centres are roused from their "collapse" by the commotion or explosive influence of the sneeze. If sneezing fails nature will try a shiver, which acts mechanically in the same way. If this fails, the effects are likely to be very serious, and bad consequences may ensue. The cold is slight when sneezing suffices to recover the nervous system quickly from its depression; and grave when even strong shivering fails to do so. In case of chill, with threatened cold, sneezing may be produced by a pinch of snuff of any kind. This is how some of the vaunted "cures" of cold by snuff are brought about. Brisk exercise may also ward off the attack.

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TAKE THE PROPER BATH.

There is a number of varieties of bath at each temperature. Thus, if the entire body is submerged, it is a full bath; if only half, it is a half bath; if only the feet are immersed, it is a foot bath, &c. Sponging the entire surface is an easy and convenient means of securing most of the advantages of the full bath, while the trouble of the latter (expense also) is avoided. If cold water is used, the skin is stimulated and the nervous system receives all the tonic effects to be had from bathing. The shower bath is still more stimulating to the nerves and skin. If it is cold there may be considerable risk of doing injury. This is true of all forms of "cold" baths. No one with degenerated heart or arteries should incur the dangers of the full or shower bath. The first effect of the application of cold to the skin is to cause a sudden contraction of all the small blood vessels, thus driving the blood in upon the central organs. An additional strain is thus placed upon the vessels of the lungs, brain—in fact, of the whole interior department. If their walls have been weakened by disease they may give may; apoplexy or rupture of an aneurism way follow the injudicious application of cold bathing.

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GATES OF HAPPINESS.

All men and women should rejoice to remain part child all through life, however long its course may run. The games, the dance, the anecdote, the assembly of friends, the feast, are as much a part of humanity as its natural power to laugh or to perceive the points of wit. Amusement is one of the forms of human happiness. This happiness, like old Thebes, has a hundred gates for its coming and going—the gate of tears, for man weeps when he is happy, amid music or in revisiting his mother's home; the gate of pensiveness, for he is happy when he reads "Gray's Elegy," or walks in the rustling autumn leaves; the gate of admiration, for man is happy amid the beauty of nature and of art; the gate of friendship, when heart finds its companion heart; the gate of hope, for man is happy when the coming days are pictured with these angel figures of expectation. Of these hundred gates of happiness amusement makes one—planned by the Builder of human life. It must open before us, and we may all pass in and out as long as the heart shall remain unbroken by death or grief.

PALEY AND EVOLUTION.

No doubt the doctrine, prevalent in Paley's time, of impassable limits of species, the immature condition of chemical and biological science, detaining the mind in too great dependence on mechanical conceptions, the darkness in which the geological record of the earth was still wrapped. the narrow limits of time within which both natural and human history were assumed to be compressed, presented to his imagination a world variously different from ours; incomparably smaller; divided into autonomous, though confederated, provinces, needing through the detachment of their products, a much greater multitude of divine projects and volitions, amounting in effect to so many separate creations. But that these crude conceptions have any advantages over their successors, as claimants of design, that any expression of mind which was present to Paley is lost to us, it is impossible to affirm. The great difference lies in the substitution of development for paroxysm of initiation. And this "evolution," whatever its extent, is not a cause, or even a force, but a method, which might be the path either of a voluntary cause or of a blind force, and has nothing to say to the controversy between them. If there were design before, so is there now; if not, then has none been added. But, on the other hand, if marks of thought were truly found before, they have now become marks of larger and sublimer thought; all that was detached having passed into coherence, so that one intellectual organism embraces the whole, from the animalcule in a dewdrop to the birth and death of worlds. I see no reason to doubt that Paley would have welcomed the new theory of organic life upon the globe as a magnificent expansion of this idea. He did not, I presume, regard the Creator as having, virtually, taken out an independent patent for every so-called species, to be jealously guarded from all encroachment; and if only the interrelation could have been shown to him between type and type of being, as we are taught to see it now, he would not have been slow to feel the grander meaning of the vaster family encompassed by one providing thought.—DR. MARTINEAU'S *Study of Religion.*

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The Emporer William saw, from the time of his birth to his death, six Popes, eight Emperors, fifty-two Kings, six Sultans in Europe, and twenty-one Presidents of the United States cease to reign; the only four of the list still alive being Isabella ex-Queen of Spain, Amadeo, ex-King of Spain, the ex-King of Naples, and Ex-Sultan Murad. The eighty-nine others are all dead, the six Popes being Pius VI., Pius VII., Leo XII , Gregory XVI., and Pius IX. ; while the Emperors are Francis I. and Ferdinand I. of Austria ; Napoleon I. and III. of France ; and Paul I., Alexander I., Nicholas I. and Alexander II. of Russia. Among the fifty-two kings are three of England (George III., George IV., and William IV.), five of Sardinia and Sweden, four each of Bavaria, Denmark, Naples, and Spain ; three of France, Holland, Portugal, and Prussia ; two of Hanover and Wurtemberg, King Leopold I. of Belgium, King Otto of Greece, and King Jerome of Westphalia. The six Sultans of Turkey are Selim III., Mustappa IV., Mahmud II., Abdul Medjid, Abdul Aziz, and Murad ; while the twenty-one Presidents of the United States begin with George Washington and end with the immediate predecessor of Mr. Cleveland.

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ANATOMY AND THE SOUL.

Anatomy says it has never found the soul, and adds: "Therefore, there is no soul." The reasoning o'erleaps itself, and takes away its own life by rude violence. Has anatomy found genius ? Has the surgical knife opened the chamber in which music sings, and seen the singer ? Or has anatomy laid its finger upon imagination, and held it up, saying: "Behold the mighty wizard" ? But if there is no soul simply bcause anatomy has never found one, then there is no genius, no music, no imagination, no chivalry, no honour, no sympathy, because the surgeon's knife has failed to come upon them in wounding and hacking the human frame. Anatomise the dead poet and the dead ass, and you will find as much genius in the one as in the other; therefore there is no genius. Who that valued his life would set his foot on such a bridge as that ricketty "therefore"?—DR. PARKER.

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BORING A MILE FOR COAL.

The deepest borehole in the world is at Schladenbach, near Kotschan Station, on the railway between Corbetha and Leipzig, and has been undertaken by the Prussian Government in search for coal. The apparatus used is a diamond drill, down the hollow shaft of which water is forced, rising again to the surface outside the shaft of drill, and inside the tube in which the drill works. By this method cores of about 50 feet in length have been obtained. The average length bored in 24 hours is from 20 feet to 33 feet, but under favourable circumstances as much as 180 feet has been bored in that time. The borehole, which in January, 1885, had reached a depth of 4,600 feet, and was commenced in June, 1880, but left after a year's work, recommenced at the end of 1882, and is still progressing. The cost up to January, 1885, was about £5,000.

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SEEING AND THINKING.

Some men, remarks a contemporary, would walk through a machine shop and see nothing but lathes, planers, and other machine tools, together with a loft of unfinished castings and pieces of machinery. Such men never improve methods of doing work. They never think of a better way to do a job. They plod along, thinking chiefly of killing time until pay-day. Now and then a man comes along who sees things differently. No matter what object meets his eye, the sight of it suggests something. Perhaps the object is nothing but a piece of scrap iron lying on a junk heap. No matter, our "observing man" sees the whole of that piece of iron, and it stirs up numberless thoughts and calculations as to how that piece was worn out, and what made it wear in that particular manner, and how it could have been made to wear much longer. Perhaps the observing man finds an awkward tool, expensively employed in doing a job in an indifferent manner. Our seeing man realizes in an instant the disadvantages of that particular tool, and at once sets to better the matter. A piece of bent iron, a twisted wire, or some commonplace object often gives the impressive mechanic a clue to some point upon which he has been studying for a long time. These men are the ones who make improvements. They are the kind of men needed, and all men should follow their example of trying to see all there is in everything which comes to view, no matter how insignificant or commonplace it is.

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HUNTING SABLES.

Sables are, for the most part, of nocturnal habits, and, though they occasionally feed by day, generally spend that period of the twenty-four hours in holes at the roots or in the trunks of trees. They dislike the presence of man, and are rarely to be found in the neighbourhood of the villages, their favourite resort being the depths of the forests less frequented by the natives. It is considered that the most inaccessible and least known parts of the country are the best hunting grounds. They live on hares, birds of all kinds, and, in short, almost any living thing they can kill, but they are also said to eat berries, and even fish. There are, indeed, but few few animals, apparently, which do not live on salmon in Kamschatka. They have only one litter during the year, generally in the month of April, and bring forth four or five young at a birth in a nest in the holes of trees. When the hunter is bitten for the first time by one of these animals, the bite is almost invariably followed by severe illness; but on subsequent occasions no ill effects, with the exception, possibly, of slight inflammation of the wound, are produced. There are various methods employed in catching sables, but a less number are trapped now than used formerly to be the case. Dogs are almost invariably employed to run them down in the deep snow, or to tree them; and they are also smelt out by these trained animals in their holes at the roots of trees. The great object is to tree the sable, if possible. The hunter then surrounds the base of the trees with nets, and either shakes down his quarry or knocks it off the boughs with sticks. If it does not fall into the net, it is run down by the dogs, or compelled again to take refuge in a tree. Should the tree be too high for this method to be successful, it is cut down, or the sable is shot; but the hunters generally avoid the use of the gun if possible, as it is apt to spoil the skin. The hunters usually start on their winter's expedition towards the end of September, if the destination be a distant one. If it be in better known country and closer at hand, they wait until the first snows have fallen, and do not leave before the middle of November. They train dogs especially for the purpose, and a good sable dog is one of the most valuable of a Kamschatkan hunters' possessions. A catch of twenty sables in a season is considered exceptionally good. The price of a single sable-skin in St. Petersburg is from £2 to £25; but in this higher range the hunter has small participation, the whole take of the season being disposed of to dealers at an average amounting to the lower sum nominally, but substantially reduced by a system of truck trade.

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THE USE OF MORPHIA BY LADIES.

At this moment in Paris thousands of women are cutting short their own careers by the use of morphia—not in the form of pills, but injected into their system from syringes, whose needle points they press into their arms. As though the awful vice were not seductive enough in itself—when once it has been tasted—these appliances are provided in a form which in itself is perilously handy. The morphia is made up in tiny tablets that are carried in little bottles fitting into bijou syringe cases, the whole apparatus being so small that it can conveniently be carried inside the smallest muff. All that the devotee of this fearful habit has to do is to fill the tiny bottle with water, leaving a tablet or two in it, and she has the means at hand to stupify herself at any moment. So fashionable has the vice become that women actually fill their syringes before starting for the theatre, and there, whilst lounging in the fauteuils or in their boxes, inject the dream-giving liquid into their arms. For Frenchwomen I do not know that I should weep. Were the vice confined to them, I should not trouble to write about it. But it is spreading in England, and in London is making itself widely felt. I was talking to a fashionable West-end ladies' doctor,—"I cannot say how far the habit has fastened itself upon English women," he said; "but this I do know, that many a husband imagines his wife is suffering from nervous affections, lassitude, weakness, or some organic disease, when her sole complaint is morphia. I have at this moment at least half-a-dozen cases under my care where morphia-poisoning is effecting its awful work, and where I am powerless to do any good, because I cannot tell the husband, and I cannot stop the patient. The taking of chloral was bad enough: but it involved trouble, and was not largely indulged in, except by people who could not sleep; but this new vice is sapping society to its very roots, and is rapidly on the increase. You see, it has such an enticing way with it. If a woman feels tired, or worried, or anxious, or has any little pains, it will get rid of them all, for a time, at any rate. And then so many doctors use it now. They give it for neuralgia, rheumatism, sciatica, gout, and many other complaints, and get people accustomed to it. The patient uses it a few times to get rest from pain, but the result is so pleasant that she flies to the same remedy on the first trivial occasion, and then it becomes a habit. Once matters have arrived at that point, the case is practically hopeless. There is more hope for an habitual drunkard than for 'a morphia fiend,' as the Americans call that class of patient. The health begins to fail, the body demands that dreadful drug ; the patient does not seem able to exist without it ; she can neither eat, sleep, nor, indeed, support existence without a recourse to its soothing influences ; though she must know, all the while, that it is doing its fell work, and that the end can but be death. Fortunately, the vice is not so widely spread here in England as in France ; but I am one of those who believe that some day we shall have to pass a law rendering the sale of these syringes—save to properly qualified medical practitioners—a misdemeanour, punishable with a heavy penalty."—*Echo.*

BURDETTE'S ADVICE TO YOUNG MEN.

Keep up with the procession, my boy. Don't hang back. You may be able to make things drag a little, but you can't stop the team, and you'll have to come along.

There was a man, an eminent mathematician, Dr. Lardner of Oxford, who published a treatise to prove that no steamship could ever cross the Atlantic Ocean, and the steamer *Sirius*, a few weeks later, brought the first copies of the pamphlet to America. This same eminent scientist also "staked his reputation as a man of science," before the House of Commons, on his statement that no railway train could ever go faster than ten miles an hour, and the slightest curve would invariably throw it off the track.

Babinet, the French calculator, declared that no telegram could ever be transmitted from Europe through the Atlantic to America. There was a man in America only one hundred years ago, who opposed the rebellion of the colonies because he knew it would be a failure. There was a man who laughed himself sore at Fulton's absurd ideas about steamboats. There were members of congress who wanted Morse shut up in an insane asylum becaused he talked about a telegraph, which was an impossibility.

There was a man who said you never could build a bridge across the Mississippi. There was a man who said you could never raise wheat on the great American desert. And there is a man to-day who "knows" we have reached the limit of human progress. There is a man who "knows" the people are helplessly enslaved, and will never rise to assist themselves. There is a man who "knows" that all politics are corrupt, all politicians mercenary, the civil service rotten to the core, and our social life is honey-combed with decay.

Now, my dear boy, there's only one way for you to escape that man's whining, and obstinate, mulish opposition to everything. Keep so far ahead of him that you can't hear him. And do you keep moving and drag him along. Rasp him with the double trees ; he has to come, for the old chariot never stands still a second. The difference between you and the man, my boy, is that you run, and he is dragged. You spring along with your eyes open, your head erect, and you help to keep things moving. He has his feet set in the road, his eyes shut tight, his back up on his shoulders, and his heart under the wheels. Every time you make a leap you throw the dust back in his face.

MAKE YOUR HOMES ATTRACTIVE.

Mothers and fathers who have sons and daughters growing up, do not always realise as they should the great necessity of making home not merely a place in which their children eat, sleep, and are clothed, but one in which they find positive happiness and enjoyment. In nine cases out of ten where you see a wild youth or a giddy girl—go to their homes, and you will find them cheerless, unattractive, or perhaps actually disagreeable.

The nature of youth is excessively restless ; it has a longing for action and excitement, ambitions more or less vain, and always the irrepressible desire to know a broader life. Repress these natural instincts, and you will be sure to throw them into any society that in a measure will gratify their longings. Your sons do not go to the public bar-rooms at first for the taste of liquor, which they have not as yet acquired. They go for the gay companions they find there. The influence for good or evil that a mother has over her sons, the control that she exercises over their destinies, is a grave responsibility. Throw open your best room to the children in the evenings. Have books and a magazine or two, even if you put away less money. Stimulate their ambition, and invent occupations and amusements for your children. Give them games, and endear yourself to them by sharing their joys and plays. Encourage them to be affectionate. Do not with formal coldness starve them for want of caresses.

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GRIM CURIOSITIES.

That there is a morbid interest in humanity in general in things of a ghastly nature no one who is conversant with human nature will deny. It will probably interest most readers, therefore, unless they belong to the class of superior persons whom Lord Beaconsfield once satirised, if a few of these matters be brought under their notice. Probably in fact and intention a table which stands in the Pitti Palace, at Florence, is unequalled in the world for horror and morbid association. To the careless spectator's eye it seems a mosaic of differently hued marble, and having the edge set round with brilliant artificial eyes of the different tints found in nature. There is a certain impressive and uncomfortable influence in those eyes which the most thoughtless visitor feels. And well he may, for they are real. The table itself represents long years of ghastly work, the enthusiast who made it having spent the time in obtaining, and by chemical process petrifying, the viscera of various unhappy people who died in the hospitals; while of the eyes he made, having subjected them to a similar process, the ornamental edges surrounding his horrible table. Nor was its composition its only dread association. Passing into possesion of the constructor's heir, who was a dissolute *roué* of the most advanced type, he used it as a card table, and one night, after losing heavily, shot himself, falling forward dead on the card table which his representatives very naturally got rid of by handing it over to the Government as a curiosity. It is as horrid a trophy as the stools which were found at Coomassie, and whose surfaces bore a gluey covering an inch thick, which was composed of the gore of successive "batches" of miserable victims sacrificed to the *manes* of the possessor's ancestors from time to time.

Affection or vanity, or perhaps more reasonably, a mixture of both, caused Martin von Butchell to try to arrest the the processes of nature, and so embalm his beautiful wife's remains that she might stand a fair image of herself for the delight of posterity. In 1775 the great surgeons Hunter and Cruikshank, effected the process desired. Those who have seen in the Surgeons' Museum the result of their labours can testify how melancholy is the result. A hideous simulacrum of life is in the glass case, a fleshless skull, with leatherlike skin drawn over the bones and grinning teeth, all soundness or aspect of life gone—this is the grim curiosity which a fair woman's corpse has become. All who know the history of The Terror know that at Meudon some of the victims' skins were tanned, and it is said that some copies of Rousseau's "Contrat Social" were bound in the leather. Such leather has been made in our own country. When Corder was hanged for the murder of Maria Martin, a portion of his skin was tanned and exhibited in the window of a saddler in Oxford-street. But there is an earlier and more elaborate instance. Few instances of human credulity are stronger than those which were proved at the trial of Mary Bateman, "the Yorkshire witch," duly hanged for poisoning some eighty years ago. After her execution and dissection, her skin, or a portion of it, was tanned, and in this human leather was bound, as a curiosity, thenceforward carefully preserved, an account of her trial and execution. Human skin has played other parts in the way of gruesome curios. On some of the ancient church doors in those regions of England where the Danes were fondest of landing and harrying everything and everybody with fire and sword, there remained through centuries, as tokens of those far-off, dreadful times, portions of a torn, shrivelled substance in the guise of parchment, securely nailed to the doors. These substances were pieces of the skin of some of the plunderers who had been slain in the free fights, which were matters of commonest occurrence, and who had been skinned afterwards by their foes, that their integument might remain *in terrorem* for the benefit of any Danish rover thereafter. While on the subject of human skin, allusion may be made to another curio in that line which, if not precisely grim, seems at any rate unpleasant, and that is the " caul " or skin envelope surrounding some infants' heads at birth. It may not astonish any one to know that some centuries ago a strong belief was extant that this article was efficacious in preventing its owner from drowning, and that such belief enjoyed a long existence. But what will probably astonish a good many people is that this belief is vigorous and widespread in the present day, as any acquaintance with seafaring folk or with the by no means infrequent advertisement of "Child's caul for sale," will easily prove —all School Boards notwithstanding. This belief is akin to that much more ghastly one that the hand of a man hanged by process of law, and, in some cases, the rope which was used for the execution, had some magical effect on wens if these were stroked therewith. As to the " hand " superstition, even as late as about 1831, when a wretch who had murdered and dismembered his wife at Brighton under circumstances of great atrocity was hanged, a woman was handed up on to the scaffold to have a wen stroked with the dead man's hand. As another instance of morbid taste may be mentioned the free fight of the officials when the monster Burke was hanged at Edinburgh for bits of the rope.—*Standard.*

Interesting Extracts.

ANIMILE STATISTIX.

Kats are affectionate; they luv young chickens, sweet kream, and the best place in front of the fireplace.

Dogs are faithful; they will stick to a bone after everybody else haz deserted it.

Parrots are eazily edukated, but they will learn to swear well in haff the time they will learn ennything else.

The birds eat bugs and worms for plain vittles, but their dessert consists ov the best cherries and gooseberries in the garden.

The owl is only a picture of wisdom by dalite when he can't see enny thing. When it comes nite his wisdom konsists in ketching a field mouse, if he can.

The donkey is an emblem of pachunce, but if you study them klosser you will find that lazyness is what's the matter ov them.

The eagle is the monark of the skies, but the little king-bird will chase him to his hiding-place.

The ox knoweth his master's krib, and that is all he duz kno or care about his master.

Monkeys are imitatiff, but if they kan't imitate some deviltry they ain't happy.

The goose is like all other phools—alwuss seems anxious to prove it.

If mules are ever meek it is because they are ashamed of themselves, but mules are hybrid, ain't accountable for enny thing.

The bees are a bizzy people; rather than be idle they will rob each other of their honey.

The cockroatch is a loafer, and don't seem to live so mutch on what they eat, as what they can get into.

Ducks are only cunning about one thing; they lay their eggs in sitch sly places that sumtimes they kan't find them again themselves.

The muskrat kan forsee a hard winter and provide for it, but he kant keep from gittin ketched in the sylliest kind ov a trap.

Hens kno when it is going to rain, and shelter themselfs, but they will try to hatch out a glass egg just az honest as they will one of their own.

Mudturkles are the slowest of any four-legged kritters, and yet they are always on the move, trying to get sumwhere else.

Hornets have more fight in them than enny thing of their size, but there is no method in their madness; they will pitch into a meeting-house when they are furious, just az anxious az they will into a sleeping-baby in its kradle.

The crow is the most natral of all thiefs; they will steal, and hide what iz of no use to them, nor less to enny boddy else.

Ants are the bizzyest ov all the little or big bugs, but a large share of their time is spent in repairing their houses, which ar bilt whare folks kant help but step on them.

Flies toil not, neither do they spin, yet they have the first taste ov all the best gravys in the land.

The cuckoo is the greatest ekonomist amung the birds; she lays her eggs in other bird's nests, and lets them hatch them out at their leizure.

Rats have fewer frends and more enemies than enny thing of the four-legged perswashun on the face of the earth, and yet rats are az plenty now az in the palmyest days ov the Roman Empire.

Ov all things lazy the sloth wears the belt, and yet his lazyness iz all thare iz interesting about him.

The frog dodgeth when it lightens, and the tud gaps when the thunder bellows.

The kro bilds her nest ov stix, the swallo of mud, the squirrels ov leaves, the wren of feathers and wool, and the woodpecker digs a hole for his eggs in the rotten trees.

The sarpent and the krab change their clothing each year, and the rackoon lives all winter long on the memory of what he et in the summer.

The horse allwus gits up from the ground on his fore legs first, and the cow on her hind ones, and the dog turns round three times before he lies down.

The kangaroo he jumps when he walks, the coon paces when he trots, and the lobster travels backward az fast az he can forward.

The elephant haz the least, and the rabbit the most eye for their size, and the rat's tail is just the length of his body.

The spider iz the only kritter that catches its food in a trap, and a sheep will liv without water longer than enny domestic animal.

The fox is the hardest to kitch in the trap, and a muskrat the eazyest, and the meddo lark is the shyest of all the birds ov the air.

The crow flies six miles, and the wild pidgeon sixty an hour, but the humming-bird beats all things on the wing.

The horse will eat 10 hours out of every 12; the ox lays down and chews his kudd haff the time; and the hog never knos what it iz not to be hungry.

The wild turkey can run faster than he can fly, and enny man who iz a good walker kan tire a deer out in twenty-four hours.

I kant think, in konklusion, ov enny thing just now in art, science, or morality, that mankind excel in, but what can be found, more or less developed, in the bugs, beasts, birds, and fishes.—*Josh Billings.*

◆

HOW TO BECOME A GENIUS.

"I knew a young man," said Rev. W. S. Crowe, in his lecture before the students of Eastman College, "a day labourer, who conceived an ambition for the law, and thought that first of all he ought to have a knowledge of English words During the evenings one winter, after his day's work was done, he committed the school dictionary to memory. I have plied him for hours without finding a word he would not spell and define. I knew an entry clerk who would sit at his desk while the salesmen filed past him and read their items—not the accounts, but the items: 14 1-2 yards of cloth at 78 3-4 cents a yard; 22 1-3 pounds of lard at 11 7-8 cents per pound—reading right along with rapid voice; and when the last item was announced, the final item, he would have the grand total; and would put on his hat and go home with the rest. I asked him how he did it: if it was a gift. 'Not much,' said he; 'at least I paid very dearly for that gift.' Then he told me how he came to be a genius. 'Once,' he said, 'I could not tell that in a group of men, or a pile of boxes, there were three or five, without counting them. Now I can just as readily tell that there are 18 or 26 or 35 without counting. I have acquired this ability by persistently counting thousands upon thousands of groups of objects, and associating the correct number with the size and appearance of each group. I learned addition in the same way, by infinite practice, until now I can sum four or five columns at a time as readily and accurately as one column. I learned fractions the same way, by ceaseless persistence and care. For many years I have dwelt in a world of figures, till all their combinations are as familiar to me as the keys of his instrument to a skilful pianist.'"—*Albany Journal.*

FARMERS.

Adam was a farmer while yet in Paradise, and after his fall, he was commanded to earn his bread by the sweat of his brow.

Job, the honest, upright, and obedient, was a farmer, and his stern endurance has passed into proverbs.

St. Luke was a farmer, and divides with Prometheus the honour of subjecting the ox for the use of man.

Socrates was a farmer, and yet wedded to his calling the glory of his immortal philosophy.

Burns was a farmer and the muse found him at the plough, and filled him with poetry.

THE RAILWAY FACILITIES OF THE METROPOLIS.

Taking them all round, there is probably not much fault to be found with the railway facilities of the metropolis. They are, at least, as ample, as convenient, and as complete as those of any other large city. But they have for a long time past been threatening to prove inadequate for the requirements of the population, and in a few more years they are likely to be found totally insufficient. The population of London increases at the rate of half-a-million inhabitants in ten years. Every decade we add the population of Manches- to our already greatly congested population. At the present time the chief metropolitan lines are about equal to carrying all the passengers that wish to travel by them, but very little more. If we would see how the shoe pinches, we should travel from 9 to 11 in the forenoon, or between 5 and 7 in the evening by any one of the metropolitan lines, and especially by either of the underground routes. We should then become convinced that these lines had reached the limits of their capacity, or, at least, that that stage had been all but attained. But it is quite different with the numbers and with the requirements of the population of London. That is a constantly increasing and an unknown quantity. In 20 years from now London, at its present rate of increase, will have a million more inhabitants. Each inhabitant now makes an average of some 80 journeys per annum by railway, tramway, or omnibus. Within 20 years, therefore, if the present relation of travelling to population should remain constant, it will be necessary to make provision for 80 millions of additional travellers annually within the limits of the metropolis—that is to say, a number exceeding the total number of passengers by the Metropolian and District Railways taken together only ten years ago.

This is a formidable prospect, and it suggests much work, much scheming, and great increase of resources in the immediate future. The Metropolitan and the District Railways now carry—or did in 1886—about 112 millions of passengers a year. They added about 21 millions to their annual human freight between 1880 and 1886. But in the latter year, which was the year of the Colonial Exhibition, they had almost exhausted their resources. Day by day their carriages contained nearly double the number they were capable of carrying with comfort. They ran as many trains as it was possible to get upon their lines for at least 16 hours out of the 24. The officials were worked like horses; the ticket collectors, booking-clerks, and porters like slaves. To attempt a larger traffic, even were it offered, would be alike dangerous and difficult.

It is a new thing in the history of English railways to have traffic offered or likely to be created in excess of the resources of transportation. This pass, however, is imminent on one or two of the metropolitan lines, and it may come about on some others in the near future. The public generally are not aware of the enormous growth in the travelling habits of the people of this country. Between 1875 and 1885 the number of ordinary passengers carried on the railways of England alone increased by over 170 millions. That is to say, each inhabitant in the latter year made 23 and in the former 19 journeys by train—excluding in both years season-ticket holders. But there is not much fear of chronic congestion as regards the country as a whole. It is in the metropolis that difficulty is to be apprehended, and there is little doubt that if the present facilities for travelling from one part of London to another are not increased, a time will come when there would be witnessed a chronic condition of block. The traffic, rejected by the railways from sheer inability to deal with it, would be transferred to the main thoroughfares, and the streets would become all but impassable, while their dangers, already sufficiently serious, would be greatly increased.

In these circumstances public interest is likely to be awakened in an unusual degree in two important projects that are at this moment on the carpet—one of them, the City of London and Southwark Subway, all but completed; and the other, the Metropolitan Outer Circle Railway, about to be begun. The former is designed to provide an easy and rapid means of communication between a terminal station near to the Monument and the vast transpontine population between the Borough High-street and Clapham. The latter is intended for the transport of both goods and passenger traffic on the north side of the Thames, commencing by separate junctions with the Great Western and Metropolitan District Railways at Ealing and terminating at the docks, after effecting junctions with and providing for the transfer of traffic from, the Midland, Great Northern, South-Western, South-Eastern, and other main lines of railway. The former scheme will cost rather over half a million: the latter will cost about a million and a quarter. Taken together, the two schemes will afford an immense relief to the metropolis, in dealing with traffic where it is already most congested and where there is serious liability to its becoming more so. This result will be accomplished with a comparatively small addition to the vast capital already expended on Metropolitan lines. At the end of 1886, that capital, as regards the two Metropolitan lines proper, the North London, the London, Chatham and Dover, and the London, Brighton, and South Coast Railways, was estimated at 80 millions sterling, so that the two new schemes will only involve an outlay of 2 per cent. on the already existing railway capital of the metropolis, as represented by the above lines.

One remarkable feature of the new Outer Circle Railway is that it will be an entirely independent line, serving all the other railways, and linking them with the river and the docks, and yet belonging to none of them. It will also be the first independent line that has been built in London for many years. Its principal function in the meantime will be to collect and deliver goods traffic, being, in fact, the distributing medium between the shipping and the railway interests, but it will also have passenger stations at Kingsbury, Hyde, Hendon, Finchley, Southgate, Bowes Park, Tottenham, and Edmonton. This is a district which is at present rather sparsely populated, but it is the district of the future on the north side of London, and with the new railway facilities about to be provided its growth is likely to be rapid and considerable.—*Times.*

Humorous.

GEORGIA GIRLS STAMPEDED.

A few days ago, in the new town of Rochelle, on the Americus, Preston and Lumpkin, a farmer walked up to the station leading a young steer by a rope attached to his horns, which steer was drawing a two-wheel cart, and in the cart sat an old lady and two buxom young girls. They, the girls, had never before seen a railroad, and had come down on this quiet Sabbath morn to see the monster for the first time.

After driving the steer and cart over the road, the old man drove up by the side of the track a few feet and halted. Just then the whistle of the engine was heard as it approached the station, and the rumbling sound was heard for the first time by the two girls. They both jumped up as the steaming, shrieking engine came rushing into view, while Buck threw up his head and began to back.

The old man yelled "Whoa, Buck!" while the old woman said, "Sot still, Victoria Elizabeth, you an' Josephine Boarnergus, it ain't er gwain ter hurt yer. Me an' yer pap has rid on keers," and she caught hold of the dress of each one, but the engine gave another shriek, and seemed to be dashing straight on them. Both girls jumped out, one on either side of the wagon, while Buck gave a snort and started off at full tilt. Pap held on to the rope, and was jerked along at the rate of 20 miles an hour, hollering "Whoa, Buck! yer dern fool, it won't hurt yer," while the old woman was spilled in a terribly mixed up state with her clothing, calling first to one girl and then the other, "Victoria Elizabeth, yo' and Josephine Boarnergus stop there, ther thing can't run off the track."

But the entreaty was in vain; the girls heard her, but believed their salvation was in flight, and they ran about as fast as Buck, while the old woman picked herself up and started after "Victory." Josephine was going at lightning speed and approaching a fence, leaped over it like a deer, but her dress caught on a stake, and there was a tearing sound, but no stop—she went flying over the field like a racer, while her skirts flew to the breeze like a banner of defiance. The old woman, with some help, caught Victoria Elizabeth, while the old man ran Buck into the corner of a fence and soon had him securely tied; but Josephine had a good half-mile start when the old man went in pursuit, saying: "Gosh! how that leetle creetur can hop. I'll hatter be mighty spry to cotch her in ten miles o' here!" And he put on like a quarter horse. The old woman and two other parties were holding Victoria Eiizabeth when the train moved off, but we have not heard whether the old man ever caught up with "Josephine Boarnergus" or not.

SEEING HIM OFF.

A man jumped off a tramcar the other day, and went running down the street at a mad pace, muttering:

"Confound the luck!" and "The villain, if I only catch him this time."

Small boys began to follow, men stopped and questioned him, but he only said:

"Just wait until I catch him—the villain!" until everyone was fairly excited, and men and boys began to rush out of their shops, and started in pursuit of this unknown rascal.

By the time they reached the railway station they were two hundred strong. The man galloped on to the platform, and, seeing the guard of the London train, pounced upon him, saying:

"Oh, here you are! Then the train hasn't gone? I've caught you this time."

"No, we don't start for twenty-five minutes," returned the guard.

"These gentlemen have kindly come to see me off," said the man, indicating the panting crowd with an affable smile. But no one stopped to wish him good-bye.

NONE OF HIS BUSINESS.

"That ton of coal looks to me about two hundred pounds short," said a family man, "and, by thunder! I'll have it weighed. The way some of these coal dealers cheat is wicked." After he had had it weighed, he said to his wife: "It's all right; weighs about a hundred pounds over." "How much will you pay for the extra weight, John?" "Nothing. That's their mistake, not mine."

◆

A PRUDENT COAL DEALER.

Gagley: "By Jove, Skinnem, I can't see why you don't keep your office warmer." Skinnem: "Can't afford to: coal's too high." Gagley: "But it's just the same when coal is cheap." Skinnem: "Oh, I don't make anything *then*, and have to economise."

◆

WHY THE WEST GIRL WOULD'NT STAY.

Wife: "Well, our new girl is going to leave, John." Husband: "Why?" "She says your manner towards her in the street is entirely too cool; that we haven't our family arms on the kitchen-stove-lids and broom-handles, and that on the whole we're not of her set."—*Texas Siftings.*

◆

RATHER DISAPPOINTING TO THE REPORTER.

A reporter the other day saw four men on a street corner conversing earnestly, and he stopped. One of the party was relating a frightful runaway accident, and the reporter got his note-book and took it all down. The horse took fright from a locomotive, ran away, threw out a woman and two children, killing all three, and dragged the driver two miles, breaking every bone in his body, and crushing his skull all to bits. The reporter got the names, and then cheerfully asked: "When did this occur?" "W-e-l-l," drawled the narrator, "I think 'twas the month before last?"

WHY HE UNDERSTOOD CHEMISTRY.

Father (to daughter who has just returned from a seminary): "Have they good instruction at the seminary, Ethel?" Ethel: "Yes, indeed, the professor of chemistry was just splendid." Father: "Understood chemistry pretty well, did he?" Ethel: "Yes, I suppose so, as he had just the loveliest eyes and brown curly hair I ever saw."

◆

A gentleman was staying at a little French country inn, and there was a melancholy-looking owl, which hopped about the garden, and had only got one leg. Two or three days after his arrival he had some *gibier* (game) for dinner. The "game" was very small, but he enjoyed it immensely, and the next day he missed the owl from the garden. "Where has the owl gone to?" he inquired of the landlord. "Monsieur had a little dish of *gibier* yesterday," was the answer, to the consternation of the traveller. "Why, did you have the owl killed for my dinner?" he next asked. "I kill owl, monsieur? No, he die himself!"

◆

A STILL GREATER CURIOSITY.

"What sort of a watch is this?" asked a gentleman, as he picked up a curious old timepiece in the shop of a dealer in curiosities.

"That," replied the dealer, "is a real curiosity. It is a watch that belonged to Alexander the Great when he died on the barren island of St. Helena."

"The dickens it is! Why, man alive, in the days of Alexander the Great there were no such things as watches!"

"That's just what makes it such a rarity."

"And Alexander the Great didn't die at St. Helena."

"He didn't, eh? Well, that makes it a still greater curiosity!" And taking up the rare relic, the dealer locked it up in his burglar-proof safe.

Poetry.

THE BEGGAR'S MIRROR.

A FABLE.

A Persian beggar- once it came to pass—
Acquired an old but curious looking-glass,
Which had a value for the shiftless tramp
As wonderful as had Aladdin's lamp;
For looking on the broad, clear mirror's face,
All persons were endowed with heavenly grace.
The veriest hag who stood a moment there
Found that her face became divinely fair,
And no coarse clown could so ill-favoured be
But in this great glass beauty he could see.
So the shrewd beggar, when he strolled about,
Failed not to bring the famous mirror out,
And, holding it in front of those he met,
Unnumbered pennies he was sure to get.

Now, when the beggar died, unto his son
He gave the glass to use as he had done ;
But though the son went all the country through,
He let none but himself the mirror view,—
For, finding his own face so fair a sight,
He simply looked at it from morn till night,
Till, when he came unto his house once more,
Each day his purse was empty as before.

MORAL.

They who spend life in vanity and pride,
Will find their feast set forth by Barmecide ;
" Who draws the world to flattery's glass gains pelf,
But he's a fool who looks in it himself."

TO MY SON, AGED THREE YEARS.

Thou happy, happy elf !
(But stop,—first let me kiss away that tear)—
Thou tiny image of myself !
(My love ! he's poking peas into his ear)
Thou merry, laughing sprite !
With spirits feather-light,
Untouched by sorrow, and unsoiled by sin.
(Good heavens ! the child is swallowing a pin.)

Thou little tricksey Puck,
With antic toys so funnily bestuck,
Light as the singing bird that wings the air.
(The door ! the door ! he'll tumble down the stair !)
Thou darling of thy sire !
(Why, Jane, he'll set his pinafore a-fire !)
Thou imp of mirth and joy ;
In love's dear chain, so strong and bright a link—
Thou idol of thy parents—(Drat the boy !
There goes my ink !)

Thou cherub—but of earth ;
Fit playfellow for Fays, by moonlight pale,
In harmless sport and mirth :
(That dog will bite him, if he pulls its tail)
Thou human humming-bee, extracting honey
From every blossom in the world that blows,
Singing in youth's Elysium, ever sunny.
(Another tumble—that's his precious nose !)

Thy father's pride and hope !
(He'll break the mirror with that skipping rope !)
With pure heart newly stamped from Nature's mint,—
(Where *did* he learn that squint ?)
Thou young domestic dove !
(He'll have that jug off with another shove !)
Dear nursling of the Hymeneal nest !
(Are those torn clothes his best ?)
Little epitome of man !
(He'll climb upon the table, that's his plan)
Touched with the beauteous tints of dawning life.
(He's got a knife !)
Thou enviable being !
No storms, no clouds in thy blue sky foreseeing ;
Play on, play on, my elfin John ;
Toss the light ball—bestride the stick—
(I knew so many cakes would make him sick ;)

With fancies buoyant as the thistle-down,
Prompting the face grotesque, and antic brisk,
With many a lamb-like frisk.
(He's got the scissors, snipping at your gown!)

Thou pretty opening rose!
(Go to your mother, child, and wipe your nose!)
Balmy, and breathing music like the south,
(He really brings my heart into my mouth)
Fresh as the morn, and brilliant as its star,
(I wish that window had an iron bar)
Bold as the hawk, yet gentle as the dove.
(I'll tell you what, my love,
I cannot write unless he's sent above.)

Tom Hood.

A LOVING THAT NEVER GROWS OLD.

You think as she sits by the fire in her chair,
To wrinkles her face is a prey;
That lustre has fled from her beautiful eyes
And her locks have grown soberly grey;
That the footstep is feeble that once was so strong,
And the fingers are shrunken and cold;
There is nothing of youth but the sweet, sunny smile,
And the loving that never grows old.

But here as I sit on the opposite side,
Before me there comes as I gaze,
The beauty and grace that enraptured my soul
In the vigour of earlier days.
For the wrinkles and pallor are only a mask,
And beneath it I readily see
The grace and the truth and the wonderful charms,
That made a fond captive of me.

I see the dear lips that were curved like a bow,
The cheeks that were tinted with rose,
The eyes that grew dark when the spirit awoke,
And lightened to blue in repose;
And the long, silken lashes that modestly drooped,
Concealing her happiness, when
I told her the tale that so oft has been told
By the sons to the daughters of men.

Ah, me! through each change that our fortune has brought,
How faithful she stood by my side!
In health or in sickness, in gladness or grief,
The wife kept the vow of the bride,
And the branches that grew on the family tree,
Our children, and children of those,
Call her blessed and pray that her life may be long
And with happiness filled to its close.

Though Time in his envy her beauty would mar,
Small changes his efforts have made,
For my heart and my memory look through my eyes
On a picture that never can fade.
The Present rolls off like the clouds from the sky,
The Past in bright colours appears,
And I see all the charms that attracted me first,
Clear and strong through the mask of the years.

COMRADES, LOVE YOUR CHILDREN.

Oh, how sweet are children's voices,
Full of innocence and truth!
Poor the heart that ne'er rejoices
O'er the happy days of youth.
There is music in the laughter
Of the children at their play
That may cheer us long years after
They, perchance, have passed away.

When the twilight shades are stealing
O'er the hills, so faint and dim,
Mingled with the vespers' pealing,
Sweet the children's evening hymn.
Ah, their voices clearly singing,
Weary hearts can soon restore,
For 'tis like the angels singing,
From the far-off golden shore.

THE FOOL'S PRAYER.

The Royal feast was done ; the King
Sought some new sport to banish care,
And to his jester cried : " Sir Fool,
Kneel now, and make for us a prayer."

The jester doffed his cap and bells,
And stood the mocking court before ;
They could not see the bitter smile
Behind the painted grin he wore.

He bowed his head and bent his knee
Upon the monarch's silken stool ;
His pleading voice arose : " O Lord,
Be merciful to me, a fool !

" No pity, Lord, could change the heart
From red with wrong to white as wool ;
The rod must heal the sin ; but Lord,
Be merciful to me, a fool !

" 'Tis not by guilt the onward sweep
Of truth and right, O Lord, we stay ;
'Tis by our follies that so long
We hold the earth from heaven away.

" These clumsy feet, still in the mire,
Go crushing blossoms without end ;
These hard, well-meaning hands we thrust
Among the heart-strings of a friend.

" The ill-timed truth we might have kept,
Who knows how sharp it pierced and stung ;
The word we had not sense to say—
Who knows how grandly it had rung ?

" Our faults no tenderness should ask,
The chastening stripes must cleanse them all ;
But for our blunders—oh ! in shame
Before the eyes of heaven we fall.

" Earth bears no balsam for mistakes ;
Men crown the knave, and scourge the tool
That did his will ; but Thou, O Lord,
Be merciful to me, a fool ! "

The room was hushed ; in silence rose
The King, and sought his gardens cool,
And walked apart, and murmured low,
" Be merciful to me, a fool ! "

E. R. Sill.

Correspondence.

NOTICE TO CORRESPONDENTS.

We do not hold ourselves responsible for the opinions expressed by Correspondents.

We reserve to ourselves the right to publish or reject any correspondence

Rejected correspondence will not be returned unless accompanied by a stamped envelope.

All correspondence to be written on one side of the paper only.

We shall be glad to receive articles of interest and information on Railway Work, Machinery, &c. (English or Foreign), interesting Stories of Railway experiences, information of accidents, or any subject of general interest.

All correspondence to be addressed to MR. T. G. SUNTER, General Secretary, 17, Mill Hill Chambers, Leeds.

May 28th, 1888.

To the Editor of *A.S.L.E. & F. Monthly Journal.*

Sir,—In reading the May issue of our *Journal,* I must say I felt grieved that none of your readers had taken up the question of the Amalgamation of the two Societies of Enginemen and Firemen; whilst I see some of your correspondents are writing able letters on other matters, who, if they will only turn their attention to this, as being a question of the first and greatest importance, will do more to advance themselves and their fellow-workmen than has ever yet been done. You men who are in the north know the evil of being connected with a Society whose officials are not of yourselves. More I will not say to open up a painful matter, but trust that in your next number some energetic member of the old Society will take the matter up and ventilate the subject in a better manner than I have done.

I am,
Yours obediently,
AN OLD ENGINEMAN.

⁂

Sheffield,
May 28th, 1888.

Sir,—We are told by teetotalers that the demoralisation of the working classes is strong drink, which I to a great extent endorse, but taking enginemen and firemen, all in all, I think they will compare favourably with any of the labouring classes in that respect, and I attribute the cause of them not having reached that social elevation to which they are entitled as a responsible body of workmen, to the indifference they have displayed towards being combined as a class. Why should not we have an organisation in point of numbers second to none in the country? I am sure if they would all join our Association they would soon be enabled to command the same amount of respect as other skilled workmen, for it is first necessary to have respect for ourselves before we can hope to gain the esteem of others.

I am,
Yours truly,
TOM BRIERLEY.

◆

AMBULANCE WORK.

I am pleased to learn that the members of York Branch are manifesting a desire for moral, social, and intellectual advancement, and I hope that the minute passed at their January meeting, of which our May *Journal* contains a copy, may be carried out in its entirety; and as a means to that end, I would suggest the formation of an Ambulance and Mutual Improvement Class.

In answer to the questions asked by Mr. Roe, I may say 1st—That for an Ambulance Class it is necessary that it should consist of not fewer than 25 members. 2nd—That it is necessary to attend five of the six lectures to be eligible for examination. 3rd—That it would not be difficult to obtain the gratuitous services of a medical practitioner to deliver the lectures. 4th—That Shepherd's *First Aid to the Injured* is the text book of the Association, a careful study of which would enable a man of ordinary intelligence to pass successfully. 5th—That Sundays would be the most convenient for enginemen and firemen to meet. 6th—That I should by all means admit non-members of our Society. 7th—It was both an Ambulance and Mutual Improvement Class, and three Sundays were devoted to the reading of essays (a few of which I purpose giving in our *Journal* when time and space will permit), and every fourth Sunday was devoted to Ambulance practice.

I now give you a copy of our Rules, which are no doubt capable of improvement—

RULES.

"Rule 1.—That this Society be called the Midland Railway Nottingham Locomotive Institute.

"2.—That the meetings be held every Sunday from 2.30 to 4 p.m.

"3.—That any person belonging to the locomotive department may become a member by being introduced by two members, and approved by a majority of the Class.

"4.—That the objects of this Class shall be to promote the moral and spiritual welfare of all who can be brought within its influence.

"5.—That the meetings be opened by singing and prayer.

"6.—That no person occupy more than forty minutes in opening a subject.

"7.—That no person occupy more than five minutes at one time during the discussions.

"8.—That no person be allowed to read printed matter in the Class.

"9.—That political and doctrinal subjects be strictly prohibited.

"10.—That each person must speak on the subject under consideration, first rising and addressing the chairman.

"11.—That no person be allowed to re-open a subject after the chairman's closing remarks.

"12.—Any member being unable to open his subject shall give notice of the same to the Secretary fourteen days previous to the date of his subject being opened.

"13.—That the subscription be voluntary."

It would perhaps be well to state the necessity for Rules 8, 9, and 13.

In reference to No, 8, it was considered necessary to prohibit printed matter, so that the members should write out their essays, and try to think and develop their latent abilites, instead of simply reading from a book.

No. 9 was framed for the purpose of avoiding any ill feeling being engendered by the discussion of subjects of which so many and varied opinions are held.

No. 13 was necessary, inasmuch as we had to pay for the Class-room, &c., but did not wish a subscription to stand in the way of men joining the Class.

It is just possible that some persons may object to Sunday meetings, but to my mind there needs no apology for a class of this description, seeing that you are actuated by a desire to arouse your fellow-workmen to a true conception of fraternal love and affection for one another, and to foster and promote that bond of union which has been the means of already producing such good results. There should be no standing still in the age in which we live—the world moves on in its majestic course, and each day brings its new thoughts and ideas. New mind and matter are constantly developing, and the results of past discoveries should prepare our minds to give considerate attention to further researches among the forces which appear on the battlefield of life. The universal cry is onward!—onward! All we have of the past is its memory with its precepts, and unwise is he who attempts to obstruct the progress of mind in developing those principles that God has intended to be a blessing to our race. We must either keep pace with the day and hour in which we live, or be thrust aside and forgotten.

Trusting that they may be successful in their undertaking, and that other branches will emulate their example, ever bearing in mind that—

"For pleasure or pain, or for weal or for woe,
'Tis the law of our being—we reap what we sow;
We may try to evade them—may do what we will,
But our acts, like our shadows, will follow us still!"

I remain, yours fraternally,
Thomas Ball.

REPLIES TO QUERIES.

Sir,—The replies to Queries given in your last issue, upon the boiling point of water, are a little conflicting. The question asked was, will water boil and be converted into steam at a lower temperature than 212°. Your correspondents, Puggey and H., reply in the negative, whilst on the other hand, W. S., King's Cross, and T. B. give replies in the affirmative (and very properly so). That the boiling point depends chiefly upon the pressure upon the surface of the water is indisputable. Thus boiling which ordinarily takes place at 212° is at or near the level of the sea, where the atmospheric pressure is about fifteen pounds per square inch, and as the pressure of the atmosphere varies as you ascend or descend so also will the boiling point vary proportionately. The earth is surrounded with a layer of air supposed to be about fifty miles thick, and as air possesses weight, nothing seems more feasible to understand, than that the higher you ascend the thinner, and the lower you descend the thicker it becomes, and if we could go up to a height where the atmospheric pressure is only 10 lbs. per square inch, water would boil at a temperature of about 193°, and if we descend to a sufficient depth below the earth's surface, where the atmospheric pressure is 20 lbs. per square inch, the boiling point would be about 228°, and the pressure of steam escaping would be about 20 lbs. per square inch.

As your correspondents are equally balanced (two on each side), perhaps it would be well to quote an authority on this interesting subject, Professor Tyndall, in his excellent work entitled, "Heat a mode of Motion," expresses himself in the following words: "I found the temperature of boiling water on the summit of Mont Blanc to be 184·95° F.," that is, about 27° lower than the boiling point at the sea level; and M. N. Fosney, in his work entitled "The Catechism of the Locomotive," in reference to the same subject, says: "that water will boil in a glass tube from which the air has been exhausted, by the warmth of the hand," that is, at about 92°, and coming more direct to our own occupation as locomotive men, we find that pressure and temperature are analagous in the generation of steam in steam boilers, and that whilst steam is generated and maintained at a pressure of about 15 lbs. per square inch, from water at a temperature of 212°, so also as the pressure increases, the augmentation of temperature increases likewise, and to increase the pressure to 25 lbs. per square inch, the temperature of the water from which it is generated must be raised to 240°, at 50 lbs. pressure 281°, 100 lbs. 327°, 150 lbs. 358°, so it can readily be seen that the boiling point depends chiefly upon the pressure upon the surface of the water. Yours, Cathays.

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Nature and Use of a Vacuum.—A "vacuum" means an empty space; a space in which there is neither water nor air, nor anything else that we know of. This question may be asked, but how can the pressure of a vacuum be said to be nothing, when a vacuum occasions a pressure of 15 lbs. on the square inch. Because it is not the vacuum which exerts this pressure, but the atmosphere, which, like a head of water, presses on everything immerged beneath it. A head of water, however, would not press down a piston if the water were admitted on both its sides; for an equilibrium would then be established, just in the case of a balance which retains its equilibrium when an equal weight is added to each scale, but take the weight out of one scale, or empty the water from one side of the piston, and motion or pressure is produced; and in like manner pressure is produced on a piston, by admitting steam or air on one side. It is not, therefore, to a vacuum, but rather to the existence of an unbalanced plenum, that the pressure made manifest by exhaustion is due, and it is obvious therefore that a vacuum of itself would not work an engine. Of course, this question may be asked—with what velocity does air rush into a vacuum? With the velocity which a body would acquire by falling from the height of a homogeneous atmosphere of the same density throughout as at the earth's surface, and although such an atmosphere does not exist in nature, its existence is supposed, in order to facilitate the computation. Air rushing into a vacuum is only another example of the same general principle; the velocity of each particle will be that due to the height of the column of air which would produce the pressure sustained; and the weight of air being known, as well as the pressure it exerts on the earth's surface, it becomes quite easy to tell what height a column of air an inch square, and of the atmosphere density, would require to be, to weigh 15 lbs. The height would be 27,818 feet, and the velocity which the fall of a body from such a height produces would be 1,338 feet per second.

T. E., Neath.

QUERIES.

No. 1. Can any of your readers state the real action of the quadrant links and blocks? Yours, D. D.

No. 2. What portion of the boiler is subject to the greatest pressure? And why? Yours, J. H. W.

No. 3. How is it when a small quantity of water is thrown on a red-hot fire, it will increase rather than extinguish combustion? Yours, W. F.

No. 4. If animal heat is produced by combustion, why does not the human body burn up like the coals in a grate?

Yours, J. W.

No. 5. Sir,—Mr. Michael Reynolds has in his work on "Engine Driving," said, that if he broke a forward gear eccentric rod near a turntable, he would turn his engine and take the train complete to destination in back gear. As it is the action of both backward and forward gear rods combined, coupled to each end of slot link that adjusts the action of the slide valves, would any of your readers give the necessary information how the missing rod is substituted to adjust the action of slot link in regulating the movement of the slide valve. Mr. Reynolds has told us it can be done, but omitted to say how.

Yours, Engineman.

Society News.

OPENING OF A NEW BRANCH.

THE ORGANISING SECRETARY AT WORCESTER.

Mr. Thomas Ball addressed a meeting of enginemen and firemen at the Public Hall, Worcester, on Sunday evening, May 27th, Mr. H. Roberts presiding. The chairman, in his opening remarks, said that it had long been thought that a branch might be formed at Worcester, and as many had expressed a wish to become members in the event of a branch being established, it had been decided to call a meeting for that purpose, and he had no doubt that after they had heard the Organising Secretary's address that more would come forward. Mr. Ball, on rising to speak, received a very hearty welcome. He addressed the meeting at great length, and many of his remarks were applauded, and not a few were surprised when he told them of the rapid strides the Society had made in the last twelve months, seven hundred members having joined during that period, two hundred of them in a fortnight. At the close of his address, which was listened to with interest, the chairman invited any present to address the meeting or to ask any questions, and, in response, several spoke, and a few questions were asked, to which Mr. Ball gave satisfactory answers. A branch of twenty-eight members was then successfully opened, and officers elected. Mr. J. Trowbridge was appointed secretary, and he, in proposing a hearty vote of thanks to Mr. Ball for his address, said he was a man of whom the Society might be proud, and that he had explained the objects of the Society in a clear and simple manner, and although he should like to have seen a much larger meeting, Mr. Ball could go on his way rejoicing, knowing that his mission had been successfully accomplished in the establishment of a branch at Worcester. Mr. Ballinger seconded the vote of thanks, to which Mr. Ball suitably replied, and the meeting was then brought to a close.

I am,
Yours truly,
PRO AND CON.

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ASSOCIATED SOCIETY OF LOCOMOTIVE ENGINEERS AND FIREMEN.

It is somewhat surprising that at an important railway centre such as Worcester no branch of the Locomotive Engineers' and Firemen's Association had been formed until Sunday evening last. The occupations of the men engaged in railway work —and especially on locomotives—prevent them assembling in any number except on a Sunday or a Good Friday, so that their selection of Sunday evening for the discussion of matters seriously affecting them as a body is easily understood. The association, as may be supposed, was formed to give greater security to the labour of the members, and in a circular they say: "Experience has proved that we could have our grievances redressed if we were a thoroughly organised body, and thereby raise ourselves to that position to which our responsible duties entitle us."

One of the grievances to which the men direct attention is, that the railway companies require them to hold themselves in readiness for their disposal 144 hours per week, and yet reserve to themselves the right of not paying for any more time than they actually employ a man, which in some cases only amounts to one or two days per week. It certainly does seem somewhat unfair that a man should be precluded from following any other occupation simply because the railway company might, at some particular hour of the 24, at some haphazard day of the week, require his services, and yet, during the whole of the time that he is liable to be called upon but is not called upon, he is not entitled to any remuneration. Another serious question—one in which the travelling public is interested equally with the engineers and firemen—is that of the long and continuous spells of work which the men are sometimes called upon to undergo.

* * *

To quote from the circular: "In many instances we are called upon to remain on duty 14, 16, 18, and in some cases 24 hours, and over that at times, and are expected to carry out the responsibilities of our employment as long as the companies require us to remain on duty, and this, in most cases, in weather when nature feels the necessity of rest and refreshment the most urgent." This, surely, is a matter in which public sympathy ought to be extended to those who are entrusted with the safety of human life, and it would redound to the interest of the railway company to employ men when they are more fit for work than they can be after being on duty 16, 18, or 24 hours, let the weather be what it may. In this matter, as also in the provision of a more uniform system of signalling on railways, especially in foggy and stormy weather, the engineers and firemen certainly have the support of public opinion, and personally I wish them well in any applications which they may make to their employers. —From *Worcestershire Chronicle.*

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Stratford,
May 27th, 1888.

Sir,—Journals to hand, but you have omitted to insert our new members. We made 22 last month and 20 more gave in their names. That is, indeed, good cheer. We also enrolled six others last Sunday.

I remain,
Yours fraternally,
W. Stewart,
Branch Sec.

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Cardiff,
May 28th, 1888.

Sir,—I am pleased to inform you that we made four new members at our last meeting, and hope to report others after our next; and now we have made a start I think we shall thrive fairly well.

I remain,
Yours respectfully,
A. Hunt,
Sec.

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Birmingham,
May, 1888.

Dear Sir,—It is with great pleasure that I inform you that the Birmingham Branch is increasing in numbers and usefulness. We have good meetings, receiving new members each meeting night. We have made nine members the last few weeks. Hoping to still report further progress,

I remain,
Yours fraternally,
M. H. H.,
Sec.

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Nottingham Branch.

Sir,—I am glad to find that the question of an Orphan Fund, in connection with our Society, is now being taken up in earnest, and trust that it may soon become an accomplished fact, for to my mind there is nothing that would give greater stimulus to the Society than the establishment of the same; for it appears to me that the absence of an Orphan Fund is the only legitimate objection that can be raised by non-members for not joining our ranks, and that objection being removed, I feel certain we shall have a great influx of members, who are already aware of the utility of belonging to an association composed of men of their own calling, with whom they could meet and commune from time to time, but who remain outside the hall of the Society for the reason before mentioned. I do not wish to dictate upon what basis the affair should be formed, as that is already receiving the earnest consideration of our branches, who I trust will be in favour of its establishment.

I am, yours respectfully,
Zealous

BRANCH MEETING HOUSES.

Sheffield.
Albion Hill, Johnson Street, Wicker. Alternate Sundays.

Pontypool.
Hanbury Hotel, Griffiths Town, Newport, Mon.

Neath.
Three Cranes Inn, Wind Street, Neath. Alternate Sundays, at 7.30 p.m.

Leeds.
Prince of Wales Hotel, Mill Hill. Last Monday in month., at 11.0 a.m.

Liverpool.
American Tavern, Byrles Street, Toxteth Park. Held fortnightly.

Bradford.
Granby Hotel, Union Street, Bradford First Sunday in month.

Llanelly.
Neptune Hotel, New Dock, Llanelly.

Sandhills.
Brown Cow, Walton - on - the - Hill. Alternate Sundays.

Swansea.
Monthly—Landore Coffee Tavern. Saturday, at 8.30 p.m.
Quarterly—Oram's Coffee Tavern, Wind Street, Swansea.

Nottingham.
Mission Room, Queen's Walk, Nottingham. Every Monday at 8 p.m.

Bristol.
Phœnix Hotel, Totterdown. Every fourth Sunday at 7 p.m.

Plymouth.
At Mr. Sleeman's, 31, Hortwell Street. Last Sunday in Quarter at 6.30 p.m.

York.
Adelphi Hotel, Railway Street, York. Alternate Sundays at 8 p.m.

Paddington.
Builders' Arms, Westbourne Park, London. Every third Sunday.

Newport.
New Bridge Inn, Bridge Street. Alternate Sundays, from May 6th.

Bow.
City Arms, Devons Road, Bromley. Fortnightly, on Fridays.

Openshaw.
Drovers' Arms, Ashton Road, Openshaw. Alternate Sundays at 7.30 p.m.

Mexborough.
South Yorkshire Hotel, Mexborough. Last Sunday in the month at 7.0 p.m.

Stockport.
Nicholson's Arms, Lancashire Hill. Last Sunday in the month at 6:30 p.m.

King's Cross.
The City of London, York Road, Cattle Market, London. Monthly.

Birmingham.
Small Heath Hotel, Coventry Road. Alternate Sundays.

Battersea.
The Two Brothers, New Road, Battersea, London.

Retford.
Oddfellows' Arms, London Road, South Retford. Monthly at 8 p.m.

Lincoln.
Arcade Coffee Tavern, Lincoln. Last Sunday in the month.

Stratford.
Railway Inn, Angel Place, Stratford, London.

Wolverhampton.
Gladstone Inn, North Road, Wolverhampton. Meetings held monthly.

Grimsby.
Friendly Society Hall, Lower Spring Street. Alternate Sundays at 10 a.m.

Birkenhead.
Borough Hotel, Birkenhead. Meetings alternate Sundays.

Reading.
Blagrave Arms, Blagrave Road, Reading. Meetings fortnightly.

Blackburn.
Dolphin Hotel, Blackburn.

Peterborough.
Pavilion Hotel, Park Road.

Branch Secretaries are requested to forward us the names of their meeting houses.

* * *

LIST OF BRANCHES.

We have now branches at the following places:—

Sheffield
Neath
Plymouth
Exeter
Oxford
Leeds
Cardiff
Battersea
Bow
Lincoln
Wolverh'ton
Skipton
Retford
Birkenhead
Carnforth
York
Llanelly
Mexborough
Nottingham
Reading
Newport
Kentish Town
Paddington
Pontypool
Toton
Sandhills
Manchester
Swansea
Liverpool
Bristol
Grimsby
Gloucester
Birmingham
King's Cross
Stratford
Peterboro'
Bradford
Openshaw
Stockport
Blackburn
Worcester

LOCOMOTIVE ENGINEERS AND FIREMEN'S

Monthly Journal.

"*This that they call Organization of Labour is the universal vital problem of the world. It is the problem of the whole future for all who will in future pretend to govern men.*"—THOMAS CARLYLE.

"*I know no better definition of the rights of man:—Thou shalt not steal; Thou shalt not be stolen from; what a society were that*—PLATO'S REPUBLIC, MORE'S UTOPIA, *mere emblems of it! Give every man what is his—the accurate price of what he has done and been—no more shall any complain, neither shall the earth suffer any more.*"—THOMAS CARLYLE.

VOL. 1. JULY, 1888. No. 6.

A FEARFUL NIGHT!

HOW I SAVED A TRAIN FROM WRECK.

I WAS one of the men to patrol 15 miles of track, then meet at a little shanty situated beside the track, just large enough to hold a small stove and a few necessary supplies, and allow the men to enter. Here they stay until the train comes in sight; then outside, and display their two white lights, that the engineer may know all is well.

One night it came my turn to run the section. Before starting, it occurred to me that our supply of lantern oil at the half-way house was low, so I procured and filled a quart bottle of lard oil, the kind which is used for the purpose, put it into inside pocket of my heavy coat, buttoned it snugly about me, and started.

It was a stormy summer's night, as black as ink. My car ran smoothly over the rails, and soon I had travelled about half the distance, and arrived at a bridge crossing Snake River. Here I dismounted from the car, and pushing it ahead of me, as I passed, I gave the structure a careful examination, found everything all right, and was about mounting my car again, when I received a violent blow upon the head which stretched me senseless upon the rails.

Recovering consciousness after a few moments, I found myself bound, gagged, and lying but a few feet from a gang of masked men, whom I saw, as well as the darkness would permit, at work with bars removing one of the rails, just at the entrance of the bridge.

Train-wreckers! I had heard a great deal about the desperate character of these ruffians, but was now making my first acquaintance with them.

As they worked, they discussed the situation, and how they should dispose of me.

"I tell yer, Sam!" one big fellow exclaimed. "Best way is to tie him across the rails, and let 'em finish him."

"Yes, that's so!" echoed the party. "Dead men tell no tales, and he may have seen our faces."

"Ho! ho! ho! I won't listen to such a plan," said one who seemed to exercise some influence over them. "We shall have enough to answer for before this job is finished without killing him. How this nail sticks!" he added, with an oath. "The man who drove these spikes must have meant 'em to stay. Come, mates! He is safe enough, and if we mean business we must be lively. The train will be here in twenty minutes, and we have no time to lose," and at the rail they all sprang with a will.

Twenty minutes! What could I hope to do to save the train in my condition, with so short a time?

The thought of the terrible wreck which must result if the derailed train struck the bridge made me desperate. Straining at the cords which bound my wrists, I fancied they gave way a little. I remembered the trick of the necromancers who free themselves from their bonds by alternately contracting and expanding their muscles, and I lay in silence, working in a perfect frenzy of excitement until I was able to free my hands. In an instant my knife was out of my pocket, and my feet free.

Without waiting to free myself from the gag, I sprang to my feet, and, at the top of my speed, started down the track in the direction of the approaching train. With a yell which told me I was discovered, the whole gang started in pursuit; but I had some little start of them, and bounded along the ties, bent upon stopping the train at any cost.

In the inky blackness of the night pursuit was difficult. Soon pop! pop! pop! from the revolvers of the gang. They were firing down the track, in the hope of stopping me with a bullet.

As the gag, which I had not removed, hindered my breathing, I was forced to stop for a moment to cut it away. While so engaged, there came a second volley, this time more successful. I was struck in the left arm, midway between wrist and elbow. I should have fainted from the shock, together with the rough usuage I had previously undergone, but for my determination to keep up.

"Brace up!" I called as if addressing a companion. "No time for such foolishness now, Tom. Remember the train."

This I said aloud to myself, for the solitary work of my nightly rounds had given me the habit of talking to myself, for want of another companion.

Setting my teeth hard, I overcame the faintness, staggered to my feet and ran on. I soon noticed that the pursuit had ceased. Either the train robbers thought that I was done for, or they had returned to their unfinished work, trusting I should be unable to stop the train.

And now it flashed upon my mind for the first time, How could I accomplish it? Light I had none—my lantern was with the wreckers.

While I was thus deliberating, still running on as fast as my condition would permit, instinctively I felt in my pocket for matches. Ah, the oil! Why had I not thought of that before? Of course!

"Of course the oil will stop them, Tom. Spread it on the rails. Their old seventy-ton locomotive can get no grip on that iron. Smear it thick, cover it well, rub it on with your palm, so—both rails, don't neglect an inch of either. For life, Tom! for life. Think of the men, women, and little children upon the train!"

I worked with the desperation of a drowning man. Upon my knees, the bottle under my disabled arm, pouring the oil, by an inclination of my body, into my right hand, and spreading it upon the rails.

In ten minutes the quart of oil was exhausted, and as a result I had both rails for quite a distance very well covered with it.

I had worked backward from the approaching train, and now rose to my feet at the end of my labour and at the terminus of the greased rails.

The train was coming.

Already the rails were singing with vibration as the heavy train approached. Here they come. How awful the sight of a big locomotive, coming straight toward one upon a dark midnight! The great, round eye of the headlight streaming out into the darkness, the roar of the exhaust, the hiss of the steam through the cylinders, together with the rush and roar of the train, made up a terrifying, though magnificent sight.

I stood upon the track, waving my hands, far enough away to spring from it before the train could reach me, but so that the head-light would shine upon me and I could be seen by the engineer. "Now for it," I thought. She strikes the oil—the big, seven-foot driving wheels spin round as though the engine had been lifted in the air.

Friction, the propelling influence, is gone now. She slackens speed. I could see the engineer plainly.

In my excitement I screamed as loud as

possible, in vain protest to the engineer, who was pulling the little lever which sands the rails.

Shouting is of no avail, they could not hear me.

Had there been sufficient up-grade there the oil would have stopped them quite. As it was, the inertia of the cars composing the train was able to push the engine over, sliding the wheels.

But one resource was left, and I thought of it just in time. I stepped as close to the rails as I dared, and with all my strength aimed the empty bottle at the head-light. It struck the glass and shattered it to splinters, and the light instantly went out.

Then came the welcome signal from the whistle for brakes, and I sank down unconscious.

When I recovered, a moment sufficed to tell the story, and, proceeding slowly, we soon came to the scene of the trouble. The rail had been removed and was lying beside the track; but, of course, the would-be wreckers had seen by our careful approach that their plan was spoiled, and had decamped.

With the tools always carried upon a train for such purposes, we soon replaced the rail and proceeded.

I was carried to the company's hospital at S——, where skilful surgeons did the best they could for me, but it was found necessary to remove my arm, as you see. And the company thought it best, to avoid my meeting with possible harm from the gang I had foiled, to transfer me to this point.

Now it is time for me to light up the station, for your train will soon be here. A pleasant journey to you, sir, and no mishaps. Good-night.

* * *

Scientific.

LOCOMOTIVES WITH RADIAL DRIVING AXLES.

Five locomotives on Klose's system are running on a narrow gauge Government line between Brod and Sarajevo, in Bosnia, Austria. These locomotives have four axles, the three forward axles being coupled together, while the fourth is under the movable tender frame. The middle axle is the driving axle, and the wheels on it have no flanges. The engine can thus run around very sharp curves, even of 100ft. radius, or 57 degrees, the sharpest on the New York elevated being 90ft. radius, or 64 degrees. The other two coupled axles are equidistant from the central axle and are specially-formed axle boxes. These boxes are so connected together that the radial movement of one in one direction causes an equal movement of the other in an opposite direction, the converging motion being regulated by levers, which are also acted upon by the tender frame, which for this purpose is made movable around a central point on the locomotive frame and acts by means of two rods. Thus all three of the movable axles converge at the same time to the same centre. The coupling rods are provided with a differential arrangement for responding to the increase or decrease in distance between the axles. The chief dimensions are as follows :—

	FT.	IN.
Distance between axles 1 and 2 and 2 and 3	5	0
Distance between axles 3 and 4	10	0
Total length of locomotive (inclusive of tender) over buffers	30	8
Height of stack from rail	10	8
Maximum width of engine	6	8
Gauge of road	2	6½
Driving wheels, dia.	3	0
Tender wheels, dia.	2	2

The weight in full working trim is about 24½ tons, distributed about equally on the four axles. Tests made by a special committee gave full satisfaction, mean speeds of 15 to 20 miles per hour and maximum of 25 to 30 miles per hour being easily attained, while curves of 175 to 200 feet radius were traversed at 22 miles per hour.

One of these locomotives has run 30,000 miles without undergoing any but the usual repairs.

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JOURNAL LUBRICATION.

The waste of power, loss of time, and risk incurred by hot boxes cannot be easily put into exact figures; but it is evident that it is worth while to incur considerable expense if hot boxes can thereby be avoided. Much importance is usually laid upon the bearing metal being of good quality, and this is no doubt a very important factor. It cannot, however, be maintained that the use of expensive bearing metal will unaided secure satisfactory results

The great variety of materials used with success in different alloys shows that many diverse metals and alloys will wear well and run cool, and the hot boxes cannot be avoided by merely using one particular bearing metal. A hard compound of copper and tin with a minimum quantity of zinc is often considered the best bearing metal, but in marine practice a metal almost composed of zinc is very largely used. The recipes for so-called Babbitt metal differ very widely, lead and zinc being largely used in some cases, and tin and antimony in other mixtures, while the difference in the behaviour of these alloys is not always in direct proportion to their cost.

A journal box or other bearing will only run cool, says the *Railroad Gazette*, when all of several conditions are observed:

1. The wearing surfaces must be sufficient.
2. The wearing surfaces must be smooth, have a uniform bearing, and be provided with oil ways which will evenly distribute the lubricant.
3. Dust must be excluded.
4. The lubrication must be constant, and must not be suspended by leakage, hot or cold weather, a slight heating of the bearing, or the effect of rapid motion on the means by which the lubricant is fed to the bearing surfaces.

It can hardly be maintained that the present crude form of journal box fulfils these conditions. The bearing surface is not sufficient for the present heavy cars run at a high speed for long distances without stopping; dust is not excluded; leakage is not prevented; the supply of lubricant is uncertain, and is affected by many extraneous causes; whilst the method by which the lubricant is conveyed to the journal is not only inefficient for its purpose, but is in itself a very frequent cause of heating. A clod iron axle is particularly apt to catch up threads of waste and wedge them under the brass, one of the most frequent causes of heating.

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TRACTION.

There are two things meant by the word "traction;" one the amount of grip or drawing power that a locomotive or other similar engine has, and the other the percentage or proportion of the amount of drawing power that is wasted or absorbed by friction between the rolling body and the road upon which it is drawn, and also the amount of axle-friction of the vehicle being drawn, where such vehicle has wheels. Of course upon up grades the traction is greater than upon levels: and upon down grades it is less. Upon grades the friction of the axles remains the same as upon levels, but going down grade there may be very little retardation between the vehicle and the road. Upon grades there is more retardation or waste traction than upon straight tracks, or as the engineer calls them, "tangents." The percentage or proportion of force required upon different roads is called the traction co-efficient. It runs about as follows under ordinary average conditions:—Upon railroads in good condition, the axles well lubricated, four pounds per ton of load; upon railroads under ordinary, but not very good condition, eight; upon a very smooth pavement, 12; on ordinary street pavements in good condition, 20; on street pavements and turnpikes, 30; on turnpikes new laid with coarse gravel and broken stone, 50; on common roads in bad condition, 150; on entirely loose ground or sand, 560. Of course where the load stalls in mud the traction is 2,240 pounds per ton

ELECTRICITY AND THE PUZZLE.

A Meriden, Conn., clothing-dealer recently offered a spring overcoat to any person solving the "anti-rattle-box" puzzle. This consisted of a short cylindrical wooden box securely sealed The point was to shake the box without rattling the contents. On the box was printed: "You can't do it; but it can be done." Those who got hold of the boxes, after shaking them in different ways, cut them open and found the contents to consist of pieces of tin of different shapes. As no method of doing the trick could be thought of, it was generally supposed that the puzzle could not be solved. Charles M. Fairchild, assistant to Superintendent Fitzgerald, of the Meriden Electric Light Company, came into possession of one of the boxes. He dissected it, noticed the bits of tin, thought a moment, and then, taking a piece of magnetised iron, replaced the cover of the box, and applied the magnet to one end It was strong enough to attract all the small pieces of tin and hold them fast to the end of the box however violently it was shaken. He got the overcoat.

LOCOMOTIVE DOMES.

It is often asked, whether domes are really a necessity in locomotive boilers. In fact, we see in this country and abroad, engines which are not provided with any domes—for instance, none of the engines built by Mr. Patrick Stirling, for the Great Northern Railway, have domes. We could quote a good many lines, both in this country and abroad, where locomotive boilers have not been provided with domes at all, whereas we find, also, some Continental lines where two domes have been employed.

We are of opinion that both practices have been carried too far to enable those unacquainted with practical railway working, to form an exact opinion on this subject.

First of all, it must be remarked here that a dome cannot be considered as a reservoir for storing steam; the dimensions adopted in this country, and even those adopted abroad, do not justify this view; the capacity of the dome is, as a rule, a very small fraction of the whole steam space. It cannot, therefore, be argued that it acts as a store of power, as some engineers think. Secondly, it must also be remarked here, that a dome is a cause of reduction of the resistance of the boiler, especially if the diameter of the former is large in comparison with that of the latter. The opening made in the barrel must be consolidated on its periphery, in order to make up for the loss of strength; as a rule, a ring of plate, having a weight equal to that of the plate cut out, should be riveted to the boiler and dome, on the periphery of the hole. This point has not been attended to on some lines. We remember an explosion caused some years ago, on a French railway, through the disregard of this simple but essential precaution. When we consider the high pressures now in use, we easily understand that locomotive engineers endeavour to obtain boilers as strong as possible, and therefore avoid any cause which might weaken a boiler, the dome amongst others. The Union of German Railway Engineers have come to a decision which seems to us a sound one, and no doubt the only solution to be accepted. They are of opinion that if the height of the steam room in the boiler is a quarter of the diameter of the barrel, no dome is needed, but that for smaller dimensions it becomes a necessity, not as a store of power, but more as a means of raising the part of the steam-pipe whence steam is taken. We think that this is also the view which led English locomotive engineers to adopt such small domes in some cases. In a boiler of small diameter, but supported by driving-wheels of large diameter, the ebullition is very active, and priming is sure to take place if the surface of the water-level is small in proportion to the quantity of steam produced per hour; under these conditions the single collecting pipe used in a locomotive without dome, is not a sufficient guarantee that a large amount of water shall not be carried away with the steam.

It seems to us that if a dome may, to some extent, remedy this evil, it may yet be a poor palliative.

The surface of the water-level in the boiler seems to play a more important part than has hitherto been thought. In fact, many devices have been tried to separate from the steam the water it keeps in suspension. This shows that the dome is not even so efficient as some people would make it out.

However, we contend, and this is our experience, that a diameter of the barrel as large as practicable, and a dome of suitable dimensions will ensure the best results. The diameter of the dome should never be more than half that of the barrel, the hole on the barrel should by all means be less than that; as for the height it may be equal to the diameter, or more, as the designer thinks fit. It must not be overlooked that a locomotive boiler should be provided with a proper man-hole, permitting not only to get in it easily, but also to examine its interior from time to time, or at least to facilitate such an examination. We do not think that the present form of dome used in this country answer this desideratum. A dome formed in two parts, of which the lower and shortest one is that belonging to the boiler, answers perfectly this end in view: it permits an easy access to workman or those engineers who have to inspect the inside of the boiler, and it also permits to repair the regulator more easily than in the case of long domes terminated simply by a cover. We regret that the old practice of making domes in two parts as aforesaid should have been discontinued in this country.

The connecting flanges should be at least one inch thick, so as not to be deformed when tightening the bolts. The joints are best made of copper wire, or asbestos board, this is the most suitable material for joints which may have to be undone frequently. Copper wire ring joints present the disadvantage that if they once get leaky a galvanic action of some kind takes place and corrodes the joint, which requires facing again, if gauze and red lead are not to be used.

As for the position of the dome, the question seems to be pretty well settled in England. The middle of the barrel top is considered as the most suitable, although this has for consequence a longer steam pipe. The advantage of this position is that the water-level is not so much disturbed on the regulator being open as in the case of a dome over the fire-box, or the front near the smoke-box.

To sum up, the dome is only a useful adjunct, as far as it permits, to raise the collecting part of the steam-pipe, and affords at the same time a means of easy access into the boiler and examination of the same. The limited dimensions which the strength of the boiler compels us to give it do not permit to make of it, or, at least, to consider it, as a store of power.—*Railway Herald.*

THE TELEPHONE 2,000 YEARS AGO.

The New York *Graphic* has unearthed the following:—"The principle of the telephone has been known for 2,000 years in India," was the rather incredible statement made last night by Fred. Amesbury, who has just returned to New York after a two years' sojourn in the land of striped tigers and wonderful fakirs. "I do not assert, mark you," continued Mr. Amesbury, "that they use the telephone as we use it, or that they have any system of general communication. What I do say is that high-caste people have a method of communicating with each other by vibratory action on a diaphragm, just as we do, but it is confined entirely to their temples, and its existence has remained a secret until within a very few years. I was in a town called Pani, about 200 miles from Madras, and while there became acquainted with an English officer, named Harrington, who was a prime favourite with the natives, because on one occasion he had saved a priest from drowning. He was a very genial, pleasant fellow, and had that peculiar magnetism about him that made and kept friends everywhere. It was through Harrington that I was enabled to learn the existence of telephonic communication and to satisfy myself of its antiquity. There are two temples in the village about a mile apart. In the interior and on the ground floor of each is a small circular structure which is guarded day and night from the natives as well as from strangers, and is supposed to be the abiding place of the 'Governing Spirit,' but in reality is the terminus of the telephone line, which is laid underground from one building to the other. The superstitious natives regarded this little structure with the greatest awe and reverence, because they had seen demonstrated before their eyes—or rather ears—the power of this spirit to communicate with the other temple. They were required to make their offerings in one building, and make known their wishes and desires. Then immediately repairing to the second temple they would be informed of all they had said and done, although neither priest had left his post. This was regarded as a demonstration of the power of the spirit. We were unable to determine the composition of the wire that connected the two buildings. It was some kind of metal, but neither steel, copper, nor brass, although it closely resembled the latter. The transmitter was of wood, and about the size of the head of a flour barrel, and to establish connection, instead of ringing a bell, the person wishing to attract attention at the other end stood close to the curious-looking thing and shouted, 'Ooey! ooey! ooey!' This was answered by a similar shout, which, while faint, was distinct, and could be heard two feet away. After Harrington and I had gained the confidence of the priests—or, rather, after he had—we were given a *carte blanche* to do as we pleased, and we talked to each other from one temple to another for more than an hour, and were enabled to make an incomplete investigation. We learned that the telephone that we saw had been in use for 30 years. The priests were very old men, and they remembered that the line of communication had been renewed only once during their incumbency. They showed us the remains of worm-eaten transmitters and wooden conduits that must have been hundreds of years old. They claimed that the system had been in existence since the creation, and laughed at us when we told them that the same principle had only been applied in England and America within the last dozen years. In every part of India and Burmah this system of secret communication exists, although hundreds of travellers have never suspected it. I believe it dates back fully 2,000 years."

WHY THE OCEAN IS SALT.

It is possible that the saline elements of sea water may be in part derived from geological formations which consisted largely of these elements, but it is generally considered that the saltness of the ocean is sufficiently accounted for by the deposition of soluble salts from the rivers. Salts of various kinds form part of the constituent ingredients of the earth's soil everywhere: they are washed out by springs and rivulets and carried to the sea by large streams; and as the evaporation which feeds the streams carries none of of the dissolved matters back again, the tendency is for the salts to accumulate in the sea. The principal saline ingredients found in ocean water are chloride of sodium, or common salt, with salts of magnesia and lime.

WEIGHT OF THE BODY.

According to experiments carried out by the Belgian *savant* Quetelet, a man attains his maximum weight towards his fortieth year, and begins to lose it sensibly towards his sixtieth year. A woman, however, does not attain her maximum weight until her fiftieth year. The ages at which people attain their maximum weight, and the weights themselves, differ in the different classes of society. In the affluent classes the average maximum weight is 172lbs., and is attained at fifty years of age. In the artisan class it is 154lbs., attained at forty. Amongst farm labourers it is 171lbs., attained at sixty. In the average classes it is 164lbs., and is reached between forty and fifty years of age.

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DANGER OF WATER IN STEAM PIPES.

Many are not aware of the danger that ensues when condensed water is permitted to accumulate in steam pipes, and no means provided for drawing off, by suitable opening provided with cocks arranged or located at the lowest points in a line of pipe.

The danger arises from the fact that when the steam encounters a body of cold water, there is rapid condensation, causing a vacuum, and the violent rush with which the water is then driven along the pipe like a water hammer, against elbows or a valve casing, is sufficient, sometimes, to drive a hole through the solid metal, as if it had been punched with a solid ram of steel. Connecting pipes between the boilers of a battery, a part of them having been cold for a few days, have been ruptured by opening the valves that closed the connection with the boilers under pressure of neglecting to properly drain the pipes. Men in charge of boilers have been seriously injured by neglecting these precautions. Not only valves have been ruptured, but steam pipes are sometimes split, in some cases for several feet of their length.

It has been proved beyond question that no steam fitter who neglects to provide for the easy and rapid removal of all water of condensation is fitted or competent to be trusted with the supervision of work requiring the intelligence and caution which is shown to be necessary in laying lines of pipe for steam.

A SOLVENT FOR RUST.

It is often very difficult, and sometimes impossible, to remove rust from articles made of iron. Those which are most thickly coated are most easily cleaned by being immersed in a solution, nearly saturated, of chloride of tin. The length of time they remain in this bath is determined by the thickness of the coating of rust. Generally twelve to twenty-four hours is long enough. The solution ought not to contain a greater excess of acid if the iron itself be not attacked. On taking them from the bath the articles are rinsed first in water, then in ammonia, and quickly dried. The iron when thus treated has the appearance of dull silver. A simple polishing gives it its normal appearance. We believe this process to be susceptible of numerous applications, and that it is destined to render great service in many industries.

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HOW DYNAMITE IS MADE.

Few people know what dynamite is, though the word is in common use. It is a giant-gunpowder ; that is, an explosive material varying in strength and safety of handling according to the percentage of nitro-glycerine it contains. Nitro-glycerine, whence it derives its strength, is composed of ordinary glycerine and nitric-acid, compounded together in certain proportions and at a certain temperature. Nitro-glycerine, though not the strongest explosive known, being exceeded in power by nitrogen and other products of chemistry, is thus far the most terrible explosive manufactured to any extent. Nitro-glycerine in itself is not safe to handle, hence dynamite is preferred. It is extensively made and consumed in the United States under the various names of Giant, Hercules, Jupiter, and Atlas powders, all of which contain anywhere from 30 to 80 per cent. of nitro-glycerine, the residue of the compound being made up of rotten stone, non-explosive earth, sawdust, charcoal, plaster of Paris, black powder, or some other substance that takes up the glycerine and makes a porous, spongy mass. Nitro-glycerine was discovered by Salvero, an Italian chemist, in 1845. Dynamite is prepared by simply kneading with the naked hands 25 per cent. of infusorial earth, and 75 per cent. of nitro-glycerine until the mixture assumes a putty condition not unlike moist brown sugar. Before mixing, the infusorial earth is calcined in a furnace in order to burn out all organic matter, and it is also sifted to free it of large grains. While still moist it is squeezed into cartridges, which are prepared of parchment paper, and the firing is done by fulminate of silver in copper capsules provided with patent exploders. Nitro-glycerine is made of nitric acid one part and sulphuric acid two parts, to which is added ordinary glycerine, and the mixture is well washed with pure water. The infusion is composed of small, microscopic silicious shells which have lost their living creatures. The cellular parts receive the nitro-glycerine and hold it by capillary attraction, both inside and out. The earth is very light. Water is expelled from it by means of a furnace, and then in the form of a powder it is mixed with nitro-glycerine. Nitro-glycerine has a sweet, aromatic, pungent taste, and the peculiar property of causing a violent headache when placed in a small quantity on the tongue or wrist. It freezes at 40 degrees Fahrenheit.

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TRAINING THE CORPUSCLES.

Professor E. Ray Lancaster, lecturing on "The Struggle for Life," at the London Institution, said that a considerable number of the most fatal diseases in man, oxen, and sheep were due to poisonous matter produced in the blood, which was known as bacteria. When this poison got into the system the duty of the corpuscles was to go for it, and they proceeded to eat as much as they could; but sometimes they could not attack it at all. The bacteria was too much for them, with the result that the bacteria grew, and very soon grew fatal to the body in which it existed. The corpuscles could, however, be educated to deal with the bacteria, and the future of preventive medicines would be the education of the white blood corpuscles. The fact that one man, by constant use, could without injury take a dose of arsenic that would kill six ordinary men, was due to the fact that he had by weakened doses been educating and training the white corpuscles. They could be taught to eat and flourish under conditions which, if not commenced gradually, would be destructive to them, and that was the principle at the base of protective inoculation. As a preventive of many fatal diseases in sheep and oxen, inoculation had been remarkably successful. The corpuscles first received a weakened breed or disease by inoculation, and thus, when a violent attack came, they were ready to receive and dispose of it. This education of the corpuscles, it seemed to him, was the explanation of the success of vaccination. They received a weak dose of the poison from the vaccine, and were in that way prepared for a stronger dose in the way of small-pox. He believed the white corpuscles could be trained to receive the most virulent poisons, and he hoped this training would be carried on so as to deal with a great number of diseases.

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CONTINUOUS BRAKES.

The Board of Trade returns on continuous brakes for the six months ending December 31st, 1887, has recently been issued. It contains nothing novel, but many of the figures are sufficiently suggestive. There has been, on the whole, a steady increase in the percentage of vehicles and engines fitted with continuous brakes during the last seven years. Thus in June, 1880, 12 per cent. of all the engines in the United Kingdom, and 7 per cent. of the coaches, were fitted. On the 31st of December last 54 per cent. of the engines and 59 per cent. of the coaches were fitted with brakes complying with the Board of Trade requirements. That is to say, they are automatic. In the same years 15 per cent. of the engines and 29 per cent of the coaches, and 39 per cent. of the engines and 31 per cent. of the coaches were fitted with continuous brakes, non-automatic, and therefore not fully complying with the Board of Trade requirements. Thus, it appears that they were at the end of last year only 7 per cent. of the engines and 10 per cent. of the coaches not fitted with continuous brakes of some kind. It is clear therefore that the field now open to inventors is very limited as far as passenger stock is concerned. They must turn their attention to goods wagons, or to the Herculean task of ejecting some now-accepted system and taking its place.

The most interesting part of the report is that which deals with failures. The Vacuum Brake Co.,of Queen Victoria-street, has issued a circular, from which we learn that during the six months dealt with by the Board of Trade returns the Westinghouse brake has run 21,004,734 miles and failed 488 times, while the automatic vaccuum brake has run 22,610,089 miles and failed 234 times. This gives for the Westinghouse brake, one fault per 43,043 miles run, and for the automatic vacuum, one fault per 96,624 miles run. This is a very taking kind of statement, and one which may possibly be useful for trade purposes ; but it is disingenuous. It is so far from conveying an accurate impression, that we confess we are somewhat surprised that the Automatic Vacuum Company should condescend to use it. There are failures and failures, and we have only to turn to the Board of Trade Blue-book to ascertain that by far the greater number of so-called failures of the Westinghouse brake involved nothing more serious than a delay of a few minutes. The same thing may be said of the defects of the automatic vacuum brake, with this difference, that they nearly all were due to the failure of the mechanism of the brake, while the great bulk of the Westinghouse failures were due to burst hose pipes. The importance of the difference lies in the circumstance that the vacuum brake is always set forth as so exceptionally simple that "there is really nothing to get out of order," while, on the other hand, it is urged that the Westinghouse brake "is so complex that it must be always failing." We may take two large railways and compare the returns. On the Great Eastern the Westinghouse brake ran 4,785,559 miles in the last six months of 1887, and and failed by the bursting of hose 198 times. There were seven other failures due to the breaking of iron air-pipes on the engine or tender,or the slacking back of nuts There was no failure of the air pumps, the triple valves, or the brake rigging. If the air pipes had [not burst the failures would have been one for every 683,655 miles. The Lancashire and Yorkshire Company uses the automatic vacuum brake. Its trains ran 4,362,939 miles, approximately the same mileage as the Great Eastern trains. It failed forty-four times. There were no failures due to burst hose. Five failures out of the forty-four were due to the breaking of engine pipes, slacking back of nuts, and other causalties similar in their nature to those recorded as occurring to the Westinghouse brake on the North Eastern. The remaining thirty-nine causalties were all due either to the delicacy of the mechanism of the brake or the want of that skilled care which the automatic vacuum system seems to demand. The following examples will illustrate our meaning :—"August 1.—The 10.15 a.m. Victoria to Staleybridge had a late start of ten minutes, unable to release the brake owing to a miniature sack bursting on engine 646—failure of material. September 23.—The 2.12 p.m. Mirfield to Bradford was delayed two minutes on the journey, unable to maintain vacuum owing to a piece of india-rubber having got in the cone of the large ejector of engine 327. September 29.—The 6.35 p.m. York to Liverpool was delayed three minutes near Wakefield unable to maintain vacuum owing to a drip valve drawing air. Caused by dirt. Engine 899. December 14.—The 6.55 p.m. Bury to Manchester was delayed three minutes at Bury owing to some dirt getting into the drip valve on engine 631." Several failures were due to frost in winter. Two examples will suffice :—"December 27.—The 8.25 a.m. Blackpool to Manchester lost ten minutes on the journey owing to the piston of engine 866 sticking owing to frost. December 27.—The 8.20 a.m. Hellifield to Victoria was delayed nine minutes on the journey owing to the brake piston of engine 894 being frozen." Thus, then, it appears that the so-called simple mechanism of the vacuum system is especially liable to break down from the failure of that mechanism, while the so-called complicated machinery of the Westinghouse system can run many millions of miles without any failure whatever.

It has long been known that from some unexplained cause the Midland Railway people are unable to work the Westinghouse brake with success. The present brake returns show that they were not more fortunate in the last six months of 1887 than they have been hitherto. The brake only made 192,172 miles on the Midland system, and yet it seems that the triple valves stuck no less than eighteen times, causing delay. On the North-Eastern system the Westinghouse brake made 5,326,944 miles, and in not one single instance did the triple valve give trouble ; and, including burst hose, there were only 101 failures. Comparing the Midland, Great Eastern, and North-Eastern, we find that on the first the triple valves gave most trouble, on the second the hose pipes, and on the third the donkey engine or air-pump caused some delays. We cannot attempt to explain the reasons for this, but there is the fact. As an example of the kind of failure of the air compressing mechanism reported, we give the following :—"July 14.—10.18 p.m. train, Newcastle to York, engine No. 1472. Eight minutes at Darlington. Donkey pump stopped for want of lubrication, driver having filled the Roscoe lubricator, which prevented it working. August 1.—5.15 p.m. train, Edinbro' to Newcastle, engine No. 1505. Ten minutes at Tweedmouth. Donkey pump failed. The main steam piston and upper valve rings being a bad fit. October 29.—3.45 p.m. train, Leeds to Thirsk, engine No. 689. Ten minutes at Leeds. Donkey pump stopped, the nut on the lower main valve head was found to have slacked back."

Concerning the single vacuum brake, it will be enough to say that there is against it a very serious record indeed ; it ran 21,436,064 miles, and there are 135 failures reported. From this it might easily be considered that it was the safest and best of all the brakes. Yet, in point of fact, there can be no doubt but that its use is fraught with danger. Lest we should be accused of overstating the case against this brake, we shall content ourselves with a few extracts :—"July 21st.—The 11 a.m. London and North-Western train, Chester to Llandudno, overshot the platform at Abergele owing to the vacuum pipe being uncoupled between two carriages. This appears to have been due to someone having crossed between the carriages at the previous station, and knocked against the pipe. August 19th.—The 1.0 p.m. train from Euston overshot the platform at Bletchley. This was owing to there being some cotton waste in the vacuum pipe on the engine. It cannot be ascertained how the waste got into the pipe." Here are three cases on the Great Northern which occurred on the 12th, 13th, and 15th of September :—"Vacuum pipe in smoke-box choked with ashes; overran Tuxford station. Vacuum connecting pipes became uncoupled ; no cause given ; overran Moor Carr-lane signals. Vacuum connecting pipes became stuffed with a piece of waste ; overran Stanningley platform." It is we feel, quite unnecessary to say what such failures as these imply.—*Engineer.*

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Miscellaneous.

ADVICE FROM MOTHERS.

As the boys grow up, make companions of them; then they will not seek companionship elsewhere.

Let the children make a noise sometimes; their happiness is as important as your nerves.

Respect their little secrets; if they have concealments, worrying them will never make them tell, and patience will probably do the work.

Allow them, as they grow older, to have opinions of their own; make them individuals, and not mere echoes.

Remember that without physical health mental attainment is worthless; let them lead free, happy lives, which will strengthen both mind and body.

Bear in mind that you are largely responsible for your child's inherited character, and have patience with faults and failings.

Talk hopefully to your children of life and its possibilities; you have no right to depress them because you have suffered.

Teach boys and girls the actual facts of life as soon as they are old enough to understand them, and give them the sense of responsibility without saddening them.

Find out what their special tastes are, and develop them, instead of spending time, money, and patience in forcing them into studies that are repugnant to them.

Impress upon them from early infancy that actions have results, and that they cannot escape consequences, even by being sorry, when they have acted wrongly.

As your daughters grow up, teach them at least the true merits of housekeeping and cookery. They will thank you for it in later life a great deal more than for accomplishments.

Try and sympathise with girlish flights of fancy, even if they seem absurd to you. By so doing you will retain your influence over your daughters, and not teach them to seek sympathy elsewhere.

Remember that, although they are all your children, each one has an individual character, and that tastes and qualities vary indefinitely.

Cultivate them separately, and not as if you were turning them out by machinery.

Encourage them to take good walking exercise. Young ladies in this country are rarely good walkers. They can dance all night, but are tired if they walk a mile. Girls ought to be able to walk as easily as boys. Half the nervous diseases which afflict young ladies would disappear if the habit of regular exercise were encouraged.

Send the youngsters to bed early; decide upon the proper time, and adhere to it.

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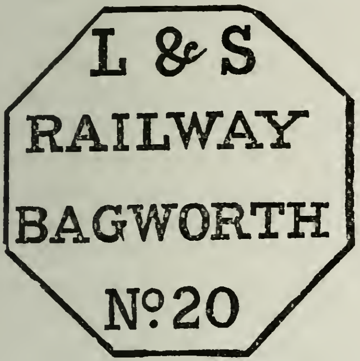
CURE FOR RHEUMATISM.

For the benefit of the large number who are suffering from rheumatism, we publish a sure cure as related to us by a gentleman who was so ill with this disease that his life was despaired of. He was confined to his bed, and so acute was his suffering that if a person walked across the room it caused him to scream out with pain. His wife heard that potato was good and as a last resort she put on half a peck of potatoes in an iron kettle over the stove and let them boil all to pieces. She then by dint of much labour and extreme pain on the part of the husband, got him up and put his feet in soak in the water, and the pain was relieved as if by magic. Cloths dipped in the hot water were then applied to his knees and other portions affected and although the application almost killed him at first, so sensitive was the first touch, yet a moment's time saw the pain allayed and the patient was soon enjoying a sweet sleep. His recovery was speedy, and he has not had a severe attack of rheumatism since. We advise all of our readers to give this simple but effective remedy a trial. The person who received such benefit has told of the remedy to many others, and in every instance it has proved successful.

AN OLD RAILWAY TICKET.

Sir,—The annexed illustration is a full-sized representation of the old brass railway tickets used on the Leicester and Swannington Railway from the opening of the line, 17th July, 1832, to 1846, when it became the property of the Midland Company. If a passenger was going from any station—for instance, to Bagworth, perhaps ticket No. 20 would be issued to him, and this number and the amount of fare paid would be duly recorded in a book.



The guard of the train carried a leather bag, somewhat in the form of a collecting-box, having a separate division for each station, into which the tickets were placed by the guard when collected, and returned to the station from whence they were issued, to be again used.

These tickets appear to be such interesting relics of early railways, that I have lately presented one of them to the South Kensington Museum.

Yours faithfully,
Clement E. Stretton,
Consulting Engineer, Associated Society of Enginemen and Firemen.
Leicester.

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THE LONG PARLIAMENT AND THE ORIGIN OF CATCHING THE SPEAKER'S EYE.

The celebrated assembly known as the Long Parliament, which met for the first time at Westminster, on the 3rd of November, 1640, commenced its proceedings at eight in the morning; but after some time the attendance of members being found slack and irregular, sundry devices were resorted to with the view of counteracting a movement which gave too much favour to early risers.

At one time a roll was called; and at another it was ordered that whoever did not come at eight o'clock, and be at prayers, should pay a fine of one shilling. On the first morning after this order was made there was an excellent attendance. The House was full, but prayers could not be said. Mr. Speaker himself was not there. At a quarter before nine in he walked.

Prayers being over, Sir Harry Mildmay congratulated the House upon the good effect of the order made on the previous day, and said to the Speaker that "he did hope that hereafter he would come in time," which made the Speaker "throw down twelve pence upon the table." Other members coming in after paid their respective shillings to the Sergeant. This shilling fine seems to have occasioned no little quibbling and contention, and it was accordingly soon relinquished. Another rule adopted in this Parliament, however, attained a firmer footing. On the 26th of November, in the same year, there was a long dispute as to who should speak, many members stood up at one time, each claiming precedence, and each backed up by his friends. The confusion became intolerable. The passing of some rule preventing such discord in future was indispensable; and at last, as Sir Simonds d'Ewes tells us, "the House determined for Mr. White, and the 'Speaker's eye' was adjudged to be evermore the rule," and so it has remained down to the present day.

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CHARACTER IN HAND-SHAKING.

The different modes of shaking hands will delineate human character better than any other single act can do, and many peculiarities of different persons may be noted in the performance of the social custom.

Who would expect to get a handsome donation—or any donation at all—from a man who will give two fingers to be shaken, and keeps the others bent as upon an "itching palm?"

The hand coldly held out to be shaken and drawn away again as soon as it decently may be, indicates a cold selfish character, while the hand which seeks yours cordially, and unwillingly relinquishes its warm clasp, gives token of a warm disposition, and of a heart full of sympathy for humanity.

How much that is in the heart can be made to express itself through the agency of the fingers! Who, having once experienced it, has ever forgotten the feeling conveyed by the eloquent pressure of the hand from a dying friend, when the tongue has ceased to speak?

A right hearty grasp of the hand indicates warmth and ardour, while a soft, lax touch, without a grasp, indicates the opposite characteristics. In the grasp of persons with large-hearted, generous minds, there is a "whole-soul" expression most refreshing and acceptable to kindred spirits.

But when a man presents you with a few cold, clammy, lifeless fingers, feeling very much like a dead fish, and expects you to do all the shaking, it will naturally make you think of the hospital and other cheerful things.

Contrary to this style, there is a habit among a rude class of giving your hand a crushing grasp, which is often most painful. In these cases there may be great kindness and a "strong" affection, but it is as crude as it is hearty.

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THE CHAIRS OF GREAT MEN.

The collection of chairs which the late Mr. George Godwin formed is now to be seen at the house where he resided in Cromwell-place, and these, with other curious and interesting relics, are about to be sold with the furniture, books, &c. The library is completely filled with these chairs, ranged round the room, and forming altogether rather a sorry spectacle of departed greatness in so many empty seats, all old and worn. The plainest of all is a little, stiff arm-chair of oak, said to be that in which Shakespeare sat and wrote, the credentials of which are to be read in a long inscription, in handwriting of the time of Garrick, let in under glass in the back of the chair. That Mr. Godwin believed in it and treated it with all reverence is well known, and there is the small chain stretched across the elbows to warn off all who might presume to sit in such a seat. The only attempt to ornament it is in a very rude carving, on the back, of a church with a steeple. It is so narrow in the seat that the poet, if he ever sat in it, must have been smaller than most men. Next to this is the library chair of John Gay, elaborately contrived, with broad-spread, well-stuffed arms and seat covered in rusty black leather, brass branches for candles at the elbows, and a flap for a desk at the back, besides a drawer in the seat for pens, ink, and paper—altogether an authentic-looking chair, and no doubt with a full pedigree forthcoming. The neighbouring chair to this is called Annie Boleyn's chair, because it came out of Hever Castle about 40 years ago. Another, quite suggestive of the attributed occupier, is that of Dr. Watts, an angular, well-made oak chair, most respectable and comfortable. Sir Walter Raleigh's chair is an important and stately seat, the frame made of turned ball work, gilt, and with a cushion, all well preserved. As a chair characteristic of the man, the huge curule of rough oak with stout arms, fit for a giant to rest on, exactly fits Walter Savage Landor. Mrs. Siddons' chair is a very different one from that she sits in as "The Tragic Muse" in Sir Joshua's splendid portrait; it is of simple bamboo, and very coarsely made. Next to it is the handsome, embroidered easy chair, elegant and comfortable, which belonged to Elizabeth Barrett Browning. Thackeray's large, well-stuffed, crimson easy chair must have been his resting chair, not his working seat, for he usually wrote with his desk upon his knees, as E. M. Ward has painted him from life in his study. Charles

Matthews' is a thoroughly well-worn, shabby affair, redolent still of good cigars. Lady Morgan's is a Louis XVI. throne-like chair in crimson Utrecht velvet, fit for the witty queen of society in her day. The favourite chair of Lytton Bulwer, in which, we are told, he wrote many of his early works at Craven Cottage, Fulham, is a circular arm chair with a cane seat. Byron's is a handsome Louis XIV. chair, well-stuffed, and in red Utrecht velvet. An uncomfortable looking, uninviting chair, covered in dark leather, was Alexander Pope's. Even for Napoleon the Great a chair is to be found, and of Louis Quatorze pattern, in green stamped velvet. Besides these chairs there are many other relics such as the curious in such things will find well worth a visit.

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BATHING IN GREAT SALT LAKE.

About four o'clock during the summer afternoons an immense cosmopolitan caravan makes its way from Salt Lake City to the bathing houses on Great Salt Lake. The city and the lake are twenty-four miles apart. Arriving at the railway station one gets off the train at a long platform. An old, barn-like structure is near, where bathing-dresses, towels, poor whisky, bad beer, and dreadful cigars are sold over one counter by any one of three men who stand behind it. It is also possible to get a flint-like sandwich. Arrived at the stairs leading into the water, the newcomer begins one of the thrilling experiences of his life. As he goes, step by step, along the white sanded floor of the lake, he has a sensation that he must either hold down his feet firmly or be shot out of the water like a cork. When he lies down flat to swim, his legs are forced out of the buoyant water, and in working his arms he finds that only by plunging them in, dog fashion, can he make any progress, and then but little. The least wind blows him along on the surface at an alarming rate. He tries to get on his feet, but he cannot sink them. In a spasm of terror, he makes desperate plunges with his legs, all to no avail. A drop of brine flies in his eye and renders it useless for some time, or he gulps some water in his throat, producing the agonies of almost strangulation. In this critical situation he seizes a rope or a pier pile in desperation and regains his feet. The first thing to do is to rush for fresh water, cleanse the injured eye and gargle the throat. He looks out on the water and sees hundreds of bathers, all lying on their backs, some with their arms under their heads as pillows, smoking or reading, some holding parasols overhead, and others with their arms stretched out, gently paddling themselves over the surface and steering with their feet. Among the latter are experts who fairly skim over the water. Surely, thinks the beginner, he can lie on his back easily enough. He tries it, paddles a short distance, and stops suddenly as he has a sensation that perhaps he has reached deep water. He attempts to sink his feet to ascertain, but they are not of sufficient weight. Oh, if he could put one foot down to ascertain the situation! In despair he determines to make a full breast of it to an expert near by, and ask help. Some kind Mormon, who has enjoyed the bath all his life, offers him suggestions like these: "Place your arms at an acute angle with your body. Now make a scoop of your hands. Thrust them under the water and keep them under your body. That's right. Now, see, every time you dip, your feet go towards the bottom. Here you are sitting up as if you were on a chair. Stand up now. Easy enough, isn't it?"

The good Mormon gives a few instructions, and soon you are idly floating or spinning around on your back, bumping against people, riding on the smooth surface or over the waves in the wildest glee. Here is the most novel and untiring amusement in the world. The atmosphere is so dry and salty that no consumptive need despair. Breathing the air, bathing in the morning in the hot sulphur springs, and in the afternoon skimming over the lake surface on one's back, will cure the generality of cases of lung troubles. Two weeks here will so effectively cure catarrh, that one need not be troubled with it again for two years.

Usually at sundown an object is seen whirling down through the mountain passes from the south-west. In an instant, down rolls great whirls of sand that partially bury the railway cars, beat with tremendous force against the rocks and boards, and riddle the surface of the lake. The storm usually lasts from one to five minutes. As it travels over the lake, one can watch it for 150 miles, with its whirling banks 3,000 feet high, which roll over and over until all seem precipitated into the lake. These storms come with terrific fury, last their brief moment, and sweep on, leaving the world as calm, as bright, and as cool as it was previously.—*Frank Leslie's Illustrated Newspaper.*

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LAWS OF HABIT.

If the period between twenty and thirty is the critical one in the formation of intellectual and professional habits, the period below twenty is more important still for the fixing of personal habits, properly so called, such as vocalization and pronunciation, gesture, motion, and address. Hardly ever is a language that is learned after twenty spoken without a foreign accent; hardly ever can a youth transfer to the society of his betters, unlearn the nasality and other vices of speech bred in him by the associations of his growing years. Hardly ever, indeed, no matter how much money there be in his pocket, can he even learn to dress like a gentleman born. The merchants offer their wares to him as eagerly as to the veriest swell, but he simply can't buy the right things. An invisible law, as strong as gravitation, keeps him within his orbit, arrayed this year as he was the last; and how his aristocratic acquaintances contrive to get the things they array themselves in will be to him a mystery to his dying day. The great thing, then, in all education, is to make automatic and habitual, as early as possible, as many useful actions as we can, and to guard against the growing into ways likely to be disadvantageous to us as we would guard against the plague. The more of the details of our daily life we can hand over to the infallible and effortless custody of automatism, the more the higher powers of mind will be set free for their own proper work. There is no more miserable human being than one in whom nothing is habitual but indecision, and for whom the lighting of every cigar, the drinking of every cup, the time of rising and going to bed every day, and the beginning of every bit of work, are subjects of express volitional deliberation. Full half the time of such a man goes to the deciding or regretting of matters which ought to have been so thoroughly ingrained in him as practically not to exist for his consciousness at all.

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WAKING AT WILL.

An old problem of the psychologists has been revived by a letter to *La Nature*, written by a French business man, who mentions that for years he has been in the habit of waking himself at any hour of the morning he wished, simply by impressing upon his mind before going to sleep the fact that he must awake at that hour, and saying further, that he seldom varies five minutes from the moment which he had assigned himself. We have a very distinct recollection of many instances in which we have ourselves tried the experiment with success, and at one time, when it was necessary for a considerable period for us to wake on certain days of the week at a very early hour, to take the first train to the place where our services were then needed, we had an opportunity of studying the circumstances under which this peculiar species of self-control is most easily exercised.

During this period we found no difficulty in waking regularly within about five minutes of the time necessary to enable us to reach the train comfortably, although for a portion of the time this involved getting up long before daylight; but we discovered also that in order to wake with precision at the right moment, and to rest quietly until it arrived, it was necessary to look at our watch just before going to sleep. If we neglected this precaution we were apt to sleep uneasily, waking first an hour or more before the proper time, and allowing ourselves in consequence only short naps afterward until the minute arrived for getting up. Whatever part of our mind it might have been that took charge of waking us seemed to begin its count of the hours from the time at which we composed ourselves to sleep, and if we did not inform ourselves of this, our conscious reckoning was correspondingly uncertain and the effort to wake vague, but if we took a clear note of the time in the evening, we could sleep peacefully through the whole of the allotted interval, sure of being aroused at or very near its expiration. Another condition of waking we found to be the occurrence of some small external event through which, as it were, the internal effort could take effect upon our senses. A very trifling circumstance—the flutter of a leaf outside the window, the chirp of a bird, or any other of the unnumbered sounds of early morning—was sufficient, if it happened at the right time, to wake us by a sort of magnifying process which at that moment gave the power of startling us by a noise which would at other times be unnoticed; but without such sensible impression we think we should not have waked; in fact, on one or two occasions we remember to have been impressed with a dim consciousness of waiting for something to happen before waking, and a moment later a trifling sound would open our senses with a little shock. To the necessity of waiting for this impression, small as it might be, we were disposed to attribute the variation of a minute or two either way from the exact moment assigned for waking, which might otherwise be kept with exact punctuality.

OUR OFFICIOUS FRIEND.

The world is full of people who take too warm an interest in other peoples' affairs, so full to overflowing that sometimes one is quite willing to wish there was another planet ready to receive the overflow. As a rule, everybody is capable of managing his own business, and the officious—that is to say, the unasked assistant in the management, be it of greater or less moment—is always a meddler, and usually a fool. This officious body is generally of an idle turn, with nothing to do and small ability to do it, or else a sycophant seeking to curry favour by becoming useful and necessary. Having nothing to do, your business offers itself; having no ability for the business at home, yours is something that can be coped with, while curiosity adds an unfailing zest to the warmth of the endeavour to be of aid.

Sooth to say, there are apt to be more women among these officious people than pride of sex allows us to find pleasant. They are omnipresent, too; they come to console you in your sorrows when you long to be left alone with your troubles, and they carry flowers to your graves for you—not always the actual material graves either, where the dead lie buried, but the graves of your happiness and joys; they pry into your religious views, and bring you good books that you have not requested of them; they waylay your children, and proffer them advice and instruction that it is to be supposed you fail to give. It is the officious woman who begs and borrows of the comfortable heathen at home in order to send parasols to the naked heathen abroad, till people with purses turn down the next corner when they see her coming; who makes herself the terror of the neighbourhood, by her untiring intrusion upon the personality of all about her; who is, in short, to be characterised by only one word—officious.

But this often kindly meant and always ill-requited quality is by no means confined to one sex. Men, in general, have so much to occupy them that they have not great opportunity or inclination for too much officiousness; yet there are not wanting shining examples in the stronger and busier sex. They warn you concerning the too-frequent visitor at your house;

they tell you your brother's worst faults in confidence, because you ought to know them, and don't, as you have not mentioned them; they tell you how you were cheated in that horse, in that cow, and how So-and-so boasts that he had the best of the bargain in that piece of land, till with what you were content you find yourself altogether dissatisfied; in fine, the officious person, whether offering to pick up your stitches and dropping more, or offering to get your paper negotiated for you and letting all the city into the secret of its worthlessness, only adds to the trouble of the world; if it is not criminal, neither is the mosquito criminal, but, all the same, it is a nuisance.

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BOOKS MADE OF CLAY.

Far beyond the plains of Mesopotamia, on the banks of the River Tigris, lie the ruins of the ancient city of Nineveh. Not long since huge mounds of earth and stone marked the place where the palaces and walls of the proud capital of the great Assyrian Empire stood. The spade, first of the Frenchman, and then the Englishman, has cleared all the earth away and laid bare all that remains of the old streets and palaces where princes of Assyria walked and lived. The gods they worshipped and the books they read have all been revealed to the sight of a wondering world. The most curious of all the curious things preserved in this wonderful manner are the clay books of Nineveh. The chief library of Nineveh was contained in the Palace of Konyunjik. The clay books which it contains are composed of sets of tablets covered with very small writing. The tablets are oblong in shape, and when several of them are used for one book, the first line of the tablet following was written at the end of the one preceding it. The writing on the tablets was, of course, done when the clay was soft, and then it was baked to harden it. Then each tablet, or book, was numbered, and assigned to a place in the library, with a corresponding number, so that the librarian could easily find it, just as our own librarians of to-day number the books we read. Among these books are to be found collections of the hymns (to the gods), descriptions of animals and birds, stones and vegetables, as well as history, travels, &c. The Assyrians and Babylonians were great students of astronomy. The method of telling time by the sun, and of marking it by an instrument called a sun-dial, was invented by the latter nation. None of our modern clocks and watches can be compared to the sun-dial for accuracy. Indeed, we have to regulate our modern inventions by the ancient Babylonian system.

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THE HEART.

The following lines express a familiar but always touching sentiment:

The flush of youth soon passes from the face,
  The spells of fancy from the mind depart;
The form may lose its symmetry, its grace,
  But time can claim no victory o'er the heart.

It is needless to multiply instances of such expressions, as our literature teems with them, and they are constantly upon our lips. One almost hesitates to profane such sacred expressions with the hint that they are one and all false to nature; yet such is the hard fact. The heart is not the source or seat of the emotions; it is, on the contrary, one of the most prosaic, although most vital, organs of the body. It is simply a hollowed-out muscle, which expands to receive the blood from the veins, and contracts to propel it again through the arteries. It is merely a natural pump, very wonderful and perfect in its structure and mechanism, but still concerned in no higher function than the purely mechanical one of regulating the supply of blood to the various organs of the body. The heart does not feel emotion. It does not warm with love or burn with hate or melt with pity, as the poets have so long assured us, and as so many familiar and popular expressions imply. All these emotions have their seat in the brain.—*Home Knowledge.*

Interesting Extracts.

FORTUNES IN PATENTS.

The Government Commissioner of Patents estimates "that from six to seven-eighths of the entire manufacturing capital of the United States, or six thousand millions of dollars (£120,000,000 sterling) is directly or indirectly based upon Patents." A calculation of the same kind in this country reveals a still more surprising result, the capital invested being enormous It has been computed that Siemen's inventions have produced more than five millions sterling, and have indirectly benefited the poor of this country largely, by creating new industries, or by reviving flagging ones.

"There is," says an eminent authority, "scarcely an article of human convenience or necessity in the market to-day that has not been the subject of a patent in whole or in part. The sale of every such article yields its inventor a profit. If we purchase a box of paper collars, a portion of the price goes to the inventor; if we buy a sewing machine the chances are that we pay a royalty to as many as a dozen or 15 inventors at once."

Lord Brougham often said that he would gladly have exchanged his honours and emoluments for the profits and renown of the inventor of ths perambulator or sewing sewing machine.

Howe, the originator of this invention, derived the princely fortune of £100,000 a year from it, and from their mechanical improvements the celebrated Wheeler and Wilson are reputed to have divided for many years an income of £200,000; while the author of the Singer sewing machine left at his decease nearly £3,000,000 sterling. "More money," says a well-known writer, "has been, and always can be, made out of patented inventions than by any other investment or occupation." The telephone, the planing machine, and the rubber patents realised many millions, while the simple idea of heating the blast in iron smelting increased the wealth of the country by hundreds of millions. The patent for making the lower end of candles taper instead of parallel, so as to more easily fit the socket, made the present enormous business of a well-known firm of London chandlers. The "Drive Well" was an idea of Colonel Green, whose troops during the war were in want of water. He conceived the notion of driving a two-inch tube into the ground until water was reached and then attaching a pump. This simple contrivance was patented, and the tens of thousands of farmers who have adopted it have been obliged to pay him a royalty, estimated at £600,000. A large fortune was realised by the inventor who patented the idea of making umbrellas out of alpaca instead of gingham, and the patentee of the improved "Paragon Frame" (Samuel Fox) lately left by will £170,000 out of the profits of his invention. The weaving, dyeing, lace and ribbon making trades originated and depend for their existence upon ingenious machinery, the result of an infinity of inventive efforts. Carpet-beating from being an untold nuisance has become a lucrative trade through the same inventive genius and mechanical contrivance. Even natural curiosity has been turned to account in the number of automatic boxes for the sale of goods of all kinds, and fabulous dividends has been paid by the public companies owning the patents. In fact, any one can be a successful inventor. In proof of this, the most profitable inventions are the improvements in simple devices, things of every-day use, that everybody wants, and which are in the power of everybody to invent. A lady derived a large income for inventing a moving belt for drying eggs, albumen, &c., and among the number of patents for small things may be mentioned the "Stylographic Pen," and a pen for shading in different colours, producing £40,000 per annum. The rubber tip at the end of lead pencils has yielded £20,000. A large fortune has been reaped by a miner, who invented a metal rivet or eyelet at each end of the mouth of coat and trousers pockets, to resist the strain caused by the carriage of pieces of ore and heavy tools.

Frequently time and circumstances are wanted before an invention is appreciated, but it will be seen that patience is well rewarded, for the inventor of the roller skate made over £200,000, notwithstanding the fact that his patent had nearly expired before its value was ascertained. The gimlet-pointed screw has produced more wealth than most silver mines, and the American who first thought of putting copper tips to children's shoes is as well off as if his father had left him £400,000 in United States Bonds. Upwards of £2,000 a year was made by the inventor of the common needle threader. The maker of the neat metal plates to preserve, at the cost of a few pence, the soles of boots and shoes from wear has now a factory of great magnitude for their production.

To the foregoing might be added thousands of trifling but useful articles from which handsome incomes are derived or for which large sums have been paid. Few inventions pay better than popular patented toys. A clergyman realised £400 a week by the invention of a strange little plaything to be seen for a long time in every toy shop window, and even in the streets of London. That favourite American toy—the "Return Ball"—a wooden ball with an elastic attached, yielded the patentee an income equal to £10,000 a year, and an income of no less than £15,000 per annum to the inventor of the "Dancing Jim Crow." The invention of "Pharaoh's Serpents," a toy much in vogue some years ago, was the outcome of some chemical experiments, and brought the inventor more than £10,000. The sale of the little wooden figure "John Gilpin" was incredibly large for many years, and a very ingenious toy, known as the "Wheel of Life," is said to have produced upwards of £100,000 profit to its inventor. One of the most successful of modern toys has been the "Chameleon Top," the sale of which has been enormous.

The field of invention is not only vast and varied, but is open to everybody without respect to sex or age, station or means. —*Invention.*

THE LANGUAGE OF ANIMALS.

The lower animals readily learn our language, so far as it serves their purpose. A dog, a horse, or a draught ox will readily obey the orders it receives, and cases are within the experience of every one in which shepherds' dogs have followed observations made by their masters, though the words were not addressed to them. Europeans will often reside for years in a foreign country without mastering the language. A dog or a horse is seldom so stupid. It will manage to pick up a difficult tongue so well that it can, even after the lapse of years, remember it distinctly. This is true not only of the domestic animals, but even of savage brutes, usually regarded as less amenable to the softer influences. For instance, in some reminiscences of his long diplomatic life in Morocco, which Sir John Drummond Hay has just published, he describes a pet leopard that he sent to the Zoological Gardens. Eight months afterwards he visited his humble retainer in Regent Park, where it bore the reputation of possessing a surly temper, which made it dangerous for anyone to approach its cage too closely. But no sooner did Sir John call to it in Arabic, "Ye Meimon. Ya habeeby boosni"—"Oh! beloved Meimon, come and embrace me"—than it bounded from the corner it which it was lying, and not only permitted its friend to stroke its head and back, but mumbled his hand affectionately in its mouth; and the last Sir John saw of the leopard was its eager eyes following him, careless of the crowd of wondering Londoners who had gathered round this fierce child of the desert. Shall we never master the languages of beasts, as even the parrot and the starling will in their own automatic way master portions of ours? To a certain extent this has been accomplished. A hunter tries to imitate by his "calls" the cries of the animals he is luring to their destruction, and is often successful in an exact ratio to his skill in this rough acquaintance with the speech of the lower animals. Mr.

Henderson, an American "gunner," has managed to set the cries of some of the game-birds in musical notation, and finds that they are quite as uniform as are the same words spoken by different persons. They have their songs of love as well as exclamations of fear and defiance. The quail has one set of notes when it is "a proud, happy, and affectionate father," and another when in the autumn he is sounding the "assembly" in order to tell the scattered birds of the chosen rendezvous for the covey. Every other bird has, in like manner, language suitable for different occasions and for special needs, and the clever sportsman can often easily wile the birds within range.—*Archæological Review.*

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INDIVIDUALITY OF CHILDREN AND RESULTS OF TEACHING.

Constant and urgent complaints are made by teachers that, in judging of results, inspectors and managers do not sufficiently take into account the individuality of children. This feeling found strong expression at the annual conference of the National Union of Elementary Teachers. The work of teachers paid by the Government and rate-payers must ever be estimated by results; those who pay must have some security as to what they get for their money. If we visit schools for the blind, the dumb, or the feeble-minded children, we see that different criteria are looked for in each case as indicating "results" of training. The individuality of children differs greatly; consequently the objects and methods of training must be various. The attainments which we desire to see in children of eleven years old are not simply such as are indicated by examinations in grammar, writing, arithmetic, &c., but also the signs of physical growth and healthiness, the signs of tidiness, intelligence, quickness, and happiness. It is an important but a difficult and complicated question how to estimate results of education; the teaching profession might do well to try and give some practical definition of "good results." An assessment of the results of school work must take into account individual differences among children; it is very undesirable that the age of children should in any large degree be taken to indicate what standard in the school a certain child ought to occupy, late developments often make very good growth. In framing a statement of results of educational work, allowance ought to be made for the variations of individuality in the children, and this can only be done by those trained to observe individual children, and able to estimate their condition and progress by what they see in them. The results to be sought in a child that is feeble, or one of poor development, differ greatly from those to be expected in children of average growth; a very moderate amount of knowledge, but fairly quick brain action, well under control, is perhaps all that can be expected, but a "good result" has been obtained if such a dull child is made to like the school, if he attends regularly, and is active and obedient. We protest that school results should not be estimated by mere scholastic work, and should not much depend upon lesson work in relation to age. The individuality of children differs immensely, so also does the special character of different teachers. Some method of estimating results must be employed, but it is highly desirable to leave considerable freedom of action to teachers, and they in their turn will be glad that the results of their work should be known and estimated. The real question at issue is not that any of us doubt the varying individuality of children and teachers, but how are we to apply tests as standards of results? This difficulty is less felt in secondary schools, where the parents' opinion of progress, and later successes of former pupils in part form a standard of school success.—*British Medical Journal.*

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HINTS FOR HEALTH.

Dyspepsia or, in plain English, indigestion— is one of the very earlist symptoms of departure from health. Its advent is usually very slow, but none the less sure; and as it depends on so many different causes, it is correspondingly difficult to get rid of. The patient, at first, treats himself; his stomach, he believes, is a little out of order, and an aperient or antibilious pill or two will soon set that to rights. Very likely he does feel relief for a time, though his trouble returns; and in his next attempt at self-cure he probably thinks he needs setting up. He is below par, he needs an extra glass or two of generous wine with his meals, and tonics. In nine cases out of ten this plan of mending matters is a mistake, for the stimulant will not improve the liver, which is already overworked, and the tonics induce constipation. For this new system more aperients are taken, and so matters go from bad to worse; and, do what he will, the sufferer finds it impossible to "drive the disease out of his system," as it is called. Well, he goes to a doctor at last with as jaunty an air as he can assume; he only "wants a little medicine," he says, "to put him right." Oh, that blind faith in physic!

He almost feels ungrateful to the doctor because he asks him questions that show he wants to probe the disease to the root, and find out the cause; for everything lies in that. The doctor will, of course, administer medicine, but he will also be careful to tell his patient what to do, and what to take and avoid.

If, when the symptoms of indigestion come on, we would at once commence to live by rule for a time, it is unlikely we should require either to go to a doctor or to take medicine. For remember this, Nature is very kind, and the removal of the cause for departure from health will usually enable her to get to rights again without further interference.

I am not writing an essay on dyspepsia, so need not give its symptoms; but I warn the reader against the abuse of aperients, tonics, and vinous stimulants as cures. Plain diet must be taken, and not too much of that; and anything that is known to disagree must be carefully avoided. It may be well to give up even tea and coffee for a time, using cocatina instead. Improvement is sure to follow; but, mark me, do not be misled by this improvement, and jump to the conclusion that you are well, and that it was the tea or the coffee that was to blame for your trouble. The giving up of any stimulant—of course tea and coffee are stimulants—nearly always results in temporary improvement; and this latter may be made permanent by careful regulation in diet. Above all, do not take much fluid of any kind, either with meals or at any other time. A cupful of hot water, with a squeeze of lemon and a small tea-spoonful of glycerine, drank about ten minutes before breakfast, may do much good; and, at all events, it is harmless.

A cold is a departure from health, and should be attended to at once. Do not let it cure itself. Get rid of it soon. Do not feed it, but starve it. One cold after another nearly always ends in thickening of the mucous membrane of the bronchial tubes, and before you are aware of it you become the victim of winter cough.

The morning tub (cold, I mean) is a very sure preventive of colds. Never overclothe nor over-heat yourself. The neck should be kept cool. Keep away from fires in-doors if you are subject to colds.

Cough may mean a serious departure from health; and the sooner one see a doctor in such a case the better. Do not be afraid to consult him. Remember, it is only those that delay who suffer in the end. I do not advise you to rush away to a physician with every trifling ailment, but—it is better to be sure than sorry. Many people would benefit much by taking cod-liver oil for a month or six weeks about the changes of the season. Probably the diet would have to be lowered a little, and an occasional mild aperient taken.

Getting thin is another serious departure from health. One generally does lose weight in winter, and regain it in summer; but a slow and steady decrease in weight calls aloud for medical interference.

Want of sleep and restless nights are symptoms which cannot be overlooked. The cause must be found and removed.—*Cassell's Magazine.*

Humorous.

A THRILLING SKETCH.

The following scene is said to have been lately exhibited in Virginia :—

Mesmeriser : "You have seen, gentlemen, this here boy was taken promiscuously from the crowd. His arm is there against the wall, and he can't take it down, nor set it down except I does it."

Crowd : "Take it down, boy."

Boy : "I can't, sir."

Crowd : "Down with it, and I will give you a twenty."

Mesmeriser : "He can't take it down, sir, no more than he can lift a millstone. You may throw as much money as you please on the floor, and all that he picks up I will pay for." (Here several of the crowd laid down quarters and halves to the amount of two or three dollars.)

Crowd: "Now, my boy, all that is yours ; take it and be off."

The arm dropped instanter. His hand fell directly on the pile, which his nimble fingers secured, and with his unmesmerised heels he made his joyful and final exit for the evening—the learned and profound professor standing himself amazed at the *un*profoundness of his own art—the villany of mankind—the want of faith and truth among parties—and, amidst the dreadful roar of the house, came demands for the restitution of the money *mesmerised* by the boy.

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A physician in a small town had long been pestered by little street arabs, who came to sell wax-lights. At last, when patience had ceased to be a virtue, he told the boy to go into the next room, where there was a fellow who smoked. The young rascal went in, and his eyes fell on an old grinning skeleton, swaying and nodding in the breeze. The boy's hair stood on end, his tongue palsied, and he dropped his stock-in-trade instanter, and scampered off as fast as his legs would carry him. The physician, a kind-hearted man withal, and very tall and lank by-the-way, fearing that he had carried the joke too far, picked up the wax-lights and ran to the pavement, crying out, "Come back, boy, there's nothing here to hurt you." "Oh, no," said the boy, gesticulating with his thumb and fingers from the end of his nose, "you don't come that over me ; I know ye, if you have got your clothes on."

◆

A BEAUTIFUL CASE.

Patient (who has met with an accident): "Is it a bad fracture, doctor ?" Doctor (a surgical enthusiast) : "Bad ? Why, its beautiful, sir, beautiful ! The bone is broken in not less than thirteen places !"

◆

"*MATTER ENOUGH!*"

When the Venerable Archdeacon Wilkins, Vicar of Nottingham, was engaged in revising the "proofs" of his well-known work, entitled *Body and Soul*, Dr. Marshall Hall, F.R.S., resided near him, and he sent him some of the proof sheets for perusal. Dr. Marshall Hall having retained these longer than was convenient to Mr. Wilkins, he facetiously wrote a note to the following effect :—

"Dear Dr. Hall,

"Do send me my body and soul ; I cannot exist any longer without them."

The note was given to Dr. Hall's man-servant, whose curiosity led him to press its sides so as to be able to read the contents, for it was long before the modern fashion of envelopes. He rushed, aghast, into the kitchen, exclaiming, "Cook, I can't live any longer with the Doctor !" "Why, what's the matter ?" "Matter enough ! our master has got Dr. Wilkins' *body and soul*, and I have too much regard for my character to stay where there are such goings on."

◆

A country newspaper, recording the running down of a cow on the railway, said it was cut into calves. An astonished naturalist waited on the editor for what the auctioneers call "further information," and received it in the following form : "Erratum.—For *calves* read *halves*."

THE TWO ACTORS.

Two American actors, unable to get an engagement, and having at last been driven hard by necessity, resolved to go into the hair-restoring business. So, one market day, the people at Little Rock were invited by a fluent and comical street lecturer to come and try his valuable hair-wash, warranted to restore hair to the baldest head. Or, rather, he only asked the public to watch an experiment with his wash.

"I will wait," said he, "until some perfectly bald man applies to me, and him I will present with enough of my preparation to make his hair grow. But we must give it time to grow—say a fortnight, and meanwhile I will remain in the town, but a fortnight hence I will ask the man whom I anoint to come back and remove his hat in the presence of the whole town."

Well, in due course, a very bald man came forward. His head was like a billiard ball, and, though professing the rudest scepticism, he nevertheless consented to have his scalp well washed with the magic fluid, and went away ridiculing the proprietor, having agreed, however, to come back in a fortnight and show himself and his head.

Every day the hair-washer appeared on the scene, but sold no wash; the bald men were waiting. At last, on the expiration of two weeks, in the presence of hundreds of people, the bald man put in an appearance.

"Well," said the hair-wash proprietor, "I will now remove this gentleman's hat, and I have no doubt as to the result—my remedy was never known to fail."

So he removed the hat, and displayed on the once bald head, a really fine and healthy growth of hair. There was no doubt about it. The bald man jeered no longer, and all the other bald men in the crowd hastened to purchase large bottles of the wash in two-dollar bottles. Before the day was out he had sold 973 of them. The hair-wash man announced that it would be his last week in Little Rock, in that way making an immense profit.

It was not until long after the hair-wash veteran had left that it became known that the bald man upon whom he had experimented was his comrade, the actor, who had had his head shaven closely for the purpose that morning. The hair-wash, on analysis, was found to be nothing but swamp water.

◆

ARTEMUS WARD IN A SLOW TRAIN.

Among the countless good stories attributed to Artemus Ward is one which tells of the advice he gave to a Southern railroad conductor soon after the war. The road was in a wretched condition, and the trains consequently were run at a phenomenally low rate of speed. When the conductor was punching his ticket, Artemus remarked, "Does this railroad company allow passengers to give it advice, if they do so in a respectful manner?" The conductor replied in gruff tones that he guessed so. "Well," Artemus went on, "it occurred to me that it would be well to detach the cow-catcher from the front of the engine and hitch it to the rear of the train. For you see we are not liable to overtake a cow, but what's to prevent a cow trolling into this car and biting a passenger?"

◆

A SURPRISING QUESTION.

Coroner: "And you say that the boiler when you inspected it was perfectly safe?" Inspector: "Yes, sir." Coroner: "And you signed the certificate accordingly?" Inspector: "Yes, sir." Coroner: "Did you personally inspect that boiler?" Inspector: "Great heavens! what are you thinking of? Do you suppose I can risk my life fooling about boilers? No, sir; I do all my inspecting at my own office."

◆

"Steam is a great thing," remarked a French traveller in a railway carriage to his *vis-à-vis*. "So it is," was the reply; "I owe my fortune to it." "Monsieur is manager of a company?" "No." "An engineer, perhaps?" "No; I have lost a number of rich relatives by railroad accidents."

Poetry.

A TALE OF THE DOVER EXPRESS.

How did I do it? Well, sit you down, if you've got ten minutes to spare,
And I'll tell you the tale how it happened to me—well, to me and my mate out there,
Don't put it all down to our boast and brag, for I'll take my oath we try,
We engine fellows, to stick to the rail, if we happen to live or die.
It isn't because with filth and grease we are covered from foot to head
That we haven't got pluck like soldier Bill in his uniform smart and red.
We haven't got bands to tootle to us, nor women, nor mates to cheer,
We march at the sound of the station bell, and the scream of the wind in our ear;
We have gals to love us, and children, too, who cling to the face and neck,
Though *we're* never called to the grand parade, or marched to the hurricane deck,
A man's a man when he does his work—well, it may be more or less,
But in Fenian days you should say your prayers when driving the Dover Express.

We started off—'twas a night in June—and the beautiful moon shone bright
Through the silent glass of the station, when our guard sang out "All right!"
He was in charge of the train, the guard—but me and my mate just then
Had taken in pledge, for good or for ill, the lives of the women and men.
Away we went at a splendid pace when we'd coupled and left Herne Hill,
Behind was the roar of a city on fire, in front was the country still.
Then we came to a point where we always turn, and mutter a sort of a pray'r
For the wife and the young 'uns asleep in the town, from the men in the engine's glare.
It wasn't like that in the train, I bet, did anyone trouble a rap?
The honeymoon couples were locked in fast, and the others were playing at "nap";
Papers, and smoking, and gossip, and chaff; does it ever strike them that a nerve
Is required from the men who must drive in the dark an express round the Chatham curve?
I looked at my watch, we were up to time, and the engine lept and sped
To the river we cross as it runs to the sea, with the Rochester lights ahead.

I often think of the train behind and the passengers fast asleep,
As we slow on the pace just to tackle the curve round Strood and Rochester Keep.
It puzzles those foreigner chaps who cross where the river in silence flows,
With the Castle one minute miles away and the next right under your nose.
You have felt the jerk? Well, that's no odds, maybe you'd have felt more odd
With a mate by your side at the engine fire who suddenly cried, "My God!
There's something ahead on the six-foot way! Look there"! And I held my breath,
A something! *And what?* on the rails ahead—we must drive for our lives or death!
There wasn't a second to pause or think, though I saw by the lights of the train
The river, the viaduct, scenes of home we never should visit again.
"What shall you do?" Then I turned and saw Tom's piteous face and sad.
"What shall I do? Hold fast, my boy! I shall cram on the pace like mad!"
Off with the brake, and shove on the steam—in a second a crash, a leap,
Right into the iron the engine tore, with the passengers fast asleep.
It reeled at the shock did their devilish snare, to the rush and the roar and the beat,
Before was dear life and the light and the air; behind was the dust of defeat!
Away to the rear went Rochester town, its danger, its storm and stress,
We'd taken a pledge, and we kept it, sir, in saving the Dover Express.

They're sending the hat round! thank you, kind, for me and my mate, you say;
Well, the money will come in easy like, when we're laid on the shelf some day.
It's only right that the women and men who arrived at Dover town,
And were saved that night round Rochester curve should cheerfully "plank it down."
But we don't want money for what we've done—there's something better than gain
If a man can earn his Victoria Cross in charge of a railway train!
If a man can prove he has plenty of pluck, and is thoroughly English made,
As well in front of a fierce express as in rear of a bold brigade!

But there's something far better than money to me, tho' it's terrible hard in town
To give the young 'uns their annual shoes and the missus a decent gown;
I'd give your money up every cent. and the moment I'd gladly bless
When you hand us the villain who wanted to wreck our lives on the Dover Express.

◆

THE WARMTH OF A WORD.

AN INCIDENT IN THE LIFE OF HENRY WARD BEECHER.

BY MARGARET J. PRESTON.

'Twas a day in the dead of winter,
And the echo of hurried feet
Struck sharp from the icy pavement
Of the pitiless city street.

Each passer was loth to linger,
Though wrapped in a fur-clad fold;
For the air was a-tingle with frost-flakes,
And the sky was benumbed with cold.

The cimeter wind, in its fury,
Bore down like a sweeping foe;
The tempest was waiting the onset,
And abroad were its scouts of snow.

Yet midst of it all, with his tatters
A-flap in the whirling blast,
A child who seemed born of the winter—
A creature of penury—passed.

So tremulous were his accents,
As he shivered, and crouched, and sung,
That the names of the mumbled papers
Seemed frozen upon his tongue.

He paused for a bitter moment,
As a wondrously genial face
Arrested his voice, and held him
With a pity that warmed the place.

"*Have a paper?*" The kind eye glistened
As the stranger took the sheet,
And glanced at the stiffened fingers,
And thought of the icy feet:

Then he dropped in his hand the value
Of his fifty papers sold;
"Ah, poor little friend!" he faltered,
"Don't you shiver and ache with cold?"

The boy, with a gulp of gladness,
Sobbed out, as he raised his eye
To the warmth of the face above him,
"*I did*, sir—till *you* passed by!"

Correspondence.

NOTICE TO CORRESPONDENTS.

We do not hold ourselves responsible for the opinions expressed by Correspondents.

We reserve to ourselves the right to publish or reject any correspondence

Rejected correspondence will not be returned unless accompanied by a stamped envelope.

All correspondence to be written on one side of the paper only.

We shall be glad to receive articles of interest and information on Railway Work, Machinery, &c. (English or Foreign), interesting Stories of Railway experiences, information of accidents, or any subject of general interest.

All correspondence to be addressed to MR. T. G. SUNTER, General Secretary, 17, Mill Hill Chambers, Leeds.

Several letters have been held over, as they have not been forwarded through their branch secretaries, the importance of this being done will be seen, as now members might be corresponding under an assumed name.

EDITOR.

To the Editor of the Associated Society of Locomotive Engineers and Firemen's Journal.

DEAR SIR,—I see your correspondent, "Old Engineman," in your last issue, feels grieved that no one took up the question of the amalgamation of the two societies. I can assure him that as a member of both societies I should like to see so desirable a result attained. I may also state that I believe that there are hundreds of members of the old society who are of the same opinion. But I should like to state that there is still a large amount of prejudice against us in some men's minds. They are of opinion that we wish to make ourselves rich at their expense. There would not be much difficulty in dispelling these prejudices if they would face the question with calm unbiassed minds. That the time will come I have not a doubt, and it is the interest of members of both societies that that the time should be hastened on when the amalgamation could be achieved. The question is asked, why amalgamate? There are many reasons, of which the following are a few:—(1) It would reduce friction, and tend to join the men in a common brotherhood; (2) We should be enabled through the old society to reach men whom it is not possible to reach now, because they hold aloof from us; (3) We could practise greater economy, as the management would be curtailed; (4) The old society would gain, from the fact that the branches would be increased, as the Associated has planted branches in districts where the old society has never reached. There are many others, but I think this will suffice for the present; what has been already stated, if the members will only take the matter up, and state their views on the subject and enlarge upon them, is quite sufficient to enable us to form an intelligent opinion on this important question. I would earnestly hope that this question may receive the earnest consideration of the members of both societies, and be met in the right spirit, actuated for the common good of all the members. One word to the old men; depend upon it the young men who are rising up at the present time are watching your action in this matter; they, the majority, are fully alive to their own interests, and know if they are to rise to your position there must be a strong organisation, and they are looking to the Associated for succour and support.

As one who loves the old society, and full of hope for the newer one, allow me to sign myself,

A MEMBER OF BOTH SOCIETIES.

THE AMALGAMATION OF THE ASSOCIATED SOCIETY WITH THE OLD STEAM ENGINEMEN AND FIREMEN'S SOCIETY.

The Secretary of the Exeter branch writes:—The successes which have attended the Associated Society, in this its seventh year of existence, is most gratifying, and while with its 41 branches making itself felt as a strength to its members, it is also permeating a feeling of trust and hope outside its borders, which is a matter for thankfulness.

But granting this, and while it is opening wide its arms to young members to join its ranks—like healthy walls of granite—still to minds given to thought, the subject cannot be viewed by them otherwise then with mixed feelings. The reason is not far to seek, for with all its marked success, nothing can make the Society be placed on a basis of absolute strength until the amalgamation of the two Societies take place.

In discussing this momentous question, I would do so with every consideration and courtesy due to those members of the old society who are opposed against the step being taken, well knowing how hard it is to break into old associations, the building up of which has been a matter of years of anxiety and care. But the question of seriousness and importance will thrust its head to the front, demanding an answer. Good as the old society has been in the past, is it keeping pace with the present times? Let us calmly look well into things as we now find them; in the first place there is an entire revolution taken place, in the railway world; shareholders were content with fair profits on their holdings years ago, 4 to 5 per cent. was then considered satisfactory. Now all is changed! To keep up the value of shares to 7 per cent., pressure is put on to reduce the expenditure of the working of the lines, which, of course, all know what that means. Look well into the M. R. strike, which like a dark cloud overshadowed those who took a manly part in it; a strike of hopeful breasts fighting for honest rights, but without unity and organisation, and being crushed like a flower, bringing suffering and disaster to many of those noble fellows. In thinking over this painful subject what efforts could the old society put forward to protect its members? Of course, the answer will readily be given, "We, as a society, have nothing to do with members working grievances!') and this shows that living in realistic times, not to grapple with the stern necessity as it stands, is surely cutting away the ground from our feet and feeding ourselves on husks. The younger men coming up in our midst demand protection as a necessary part of the benefits of the Society they belong to, and in the case of the old members of the Steam Enginemen and Firemen Society, it might be well said that the child has become father to the man. There are, I know, many obstacles in the way of the amalgamagation, one of which is the question of finance (which must be treated in a separate letter), which could be settled with dignity and justice to both societies. In conclusion, I do appeal to those fellow-members of the old society—as a member myself of over twenty years standing—to grapple with its problems, trusting that light and reason will in the end effect a powerful influence to its satisfactory solution.

◆

SPEED OF TRAINS.

The *Times* of June 1st, speaking on the acceleration of the North Western system express from Euston to Edinburgh from ten to nine hours, remarks that the former time allowed to run was simply "dawdling;" this in spite of the fact that the run of 400 miles is a speed about four miles an hour greater than is attained by the so-called lightning expresses of America.

Years ago an express booked at forty miles an hour was considered good running, but the keen competition now existing puts that rate in the back ground. We, of the working staff on the different lines, consider that forty miles an hour should be considered the average speed.

The public are very exacting on time, and it becomes yet a question why should not the working staff have a voice in the matter? Fast goods trains often attain the speed of forty miles an hour, when twenty should be considered a rational speed.

We hope this subject, which is fruitful for discussion, will be well ventilated.

Yours, Exeter.

◆

Fellow-Members,—It is with the greatest satisfaction we hail our new medium, viz., the *Journal*, of letting one another know what is passing in the various districts through which our Society now passes.

I can assure my fellow-members that it was with considerable trepidation and doubt we wrote for Mr. Sunter to come to Birkenhead to open a branch here; there was considerable opposition, and reliable friends were few; but unexpected friends turned up, men who know what it is to work for more than one railway company; or, in other words, men who know what it is to be discharged for no fault of theirs; men who know what it is to be sent away for a trifling fault, and men who have filled all previous situations with credit. They are the men who know the value and advantages of a union such as ours, and the intelligent questions they asked, and the satisfactory answers by Mr. Ball, the decisive manner in which they expressed their intention of joining, showed very plainly that although these men work underground they are not in the dark; however, we have now sufficient to form two branches, and prospects are better now than ever they were. Naturally, men cleave to societies they have been in some years, but they see now they are in the wrong one.

"Would they unite
In love and right,
And cease their scorn of one another."

We are concerned to know more about this twelve hour bill which has been before Parliament. We wonder what will loco. men think about it, if after waiting at home the first three days of the week for traffic they are then forbidden to work more than twelve hours by Act of Parliament. I don't profess to be an old parliamentary hand, but that is the interpretation I put on the matter. By reading South Wales papers it seems to be the action of men whose income does not vary with the state of trade, but if such a thing should come into force, loco. men will have to thank those whom they so liberally support. I would like to see some abler opinions on this subject in the pages of the *Journal*. We all know the hours worked on the Taff Vale Railway are out of all reason, but the Taff Vale does not comprise all the railways in the kingdom.

The letters which have appeared in the *Journal* about the Orphan Fund have all been in favour of adopting that proposal, which is a credit to the humane promptings of the writers; but this, like every other financial matter, must be dealt with in a business-like manner, and G. W. men know that the widow's allowance is a very heavy expense, indeed, in twenty-three years we have 186 widows, costing £2,455 per annum; so you see you must be careful how this matter is arranged, or the Society may lose membership on account of being such an expensive affair. More particulars can be given on this subject if asked for, and we hope our executive will not adopt this suggestion until a delegate meeting takes place.

Yours fraternally,

Darkey.

◆

ORPHAN FUND.

Sir,—In recent issues of the *Journal* I have noticed several of the correspondents are advocating the starting of an Orphan Fund in connection with the A.S.L.E.F. Sir, I always feel very reluctant to oppose anything that is proposed with good intentions, and I am only going to state my objection to this question in a way of warning to its promoters. I am afraid these gentlemen are forgetting the object for which the Society was started. I beg to remind them that the Society was started solely to protect our labour, so that we may be prepared to meet any pressure that may be forced upon us. To prove this, I should like to tell them that there was a divided opinion at the first delegate meeting that met to frame the rules of the Society, whether a sick fund should be attached to it, and I for one would have been pleased if the opposition carried it. My advice is, don't be in too much hurry; don't spoil a good thing by being too good-hearted. To add more responsibility to the Society in its present state would be disastrous to the object we have in view. The first thing we must do is to fortify our labour, and when we feel ourselves on good firm ground we may then see about anything new.

Cymro.

ANSWERS TO QUERIES.

Sir,—No. 1. The shaft with levers on it, connected with the eccentric rods, and quadrant links and blocks, and slide valve rods, in the expansion gear class of engines. Both arrangements effect the object of moving the slide valve so as to admit steam to the contrary side of the piston to which it had previously been admitted and thus reverse its motion, and with it the motion of the engine also. The distance which the slide valve travels in one direction for each stroke of the piston: This is from four to five inches generally, but is reduced by each variation of the expansion gear, which is accomplished by the action of the quadrant links and blocks.

No. 2. The boiler, being cylindrical, has an equal strain in all directions from the pressure of the steam, but, as the fireboxes are flat on all sides, except the top of the external one, they would have a tendency to be separated from each other by the pressure of the steam if they had not some support. For this purpose they are connected together by a number of copper bolts which are screwed along their whole length. As the roof of the internal fire-box only requires support, that of the external one being cylindrical, it is strengthened by six iron ribs, placed parallel to each other, and longitudinally upon the roof, and fastened to it by bolts screwed through the roof plate. The ribs are cut away on the underside between each of the bolts, so as to touch the roof plate only where the bolts pass through them, for when a considerable thickness of metal is interposed between the water in the boiler and the fire, the heat cannot be absorbed by the water with such rapidity as it is supplied, and the metal becomes in consequence greatly heated, and is rapidly destroyed.

T. E.,

Neath.

No. 3. Water is composed of oxygen and hydrogen gases, and in throwing a small quantity of water on to a red-hot fire, the carbon of the fire separates the two gases and combustion is increased. If on the contrary, a large quantity of water be thrown on the fire, the heat is diminished to that degree that the combustible matter loses the power of separating the water and the fire is extinguished.

Yours, T. B.

No. 4. If animal heat is produced by combustion, why does not the human body burn up like coals in a grate? So it does, every muscle, nerve, and organ of the body wastes away like a burning candle, and being reduced to ashes similar to coals in a grate, is of no further use to the system.

Yours, T. B.

No. 5. In referring to page 16 in Mr. M. Reynold's book, the kind of expansion link which is generally adopted by English locomotive builders is the curved open link furnished with carriers for the lifting links on the weigh bar shaft, varying the periods of admission of steam by shifting the link on the block. The horizontal motion of the link is communicated by the jointed action of the eccentrics. The movement is conveyed directly through the block to the slide valve, and the valve receives its maximum travel when the eccentric rod occupies a position in a straight line with the valve spindle. When the fore-gear rod is removed, then the bottom rod will come into action and work the slide, the top rod then merely moves its end of the slotted link backwards and forwards with affecting the valve. Therefore the foregear rod does not perform the important part of this matter, and I think it might be done as Mr. Reynolds says.

Yours,
W. S.,
King's Cross.

QUERIES.

No. 1. In what position is the crank when an engine is exhausting?

Yours,
FIREMAN.

No. 2. What takes place in the Cylinders when an engine is running with the lever reversed?

Yours, J. W.

Society News.

THE ORGANISING SECRETARY AT STOURBRIDGE.

OPENING OF A NEW BRANCH.

A general meeting of locomotive enginemen and firemen was held at the Mitre Hotel, Stourbridge, on Sunday, June 24th, under the auspices of the A. S. L. E. & F., Mr. M. Hudson, of Birmingham Branch, presiding, supported by a number of Birmingham and Stourbridge friends. The Chairman, in his opening remarks, alluded to the object in calling the meeting—viz., to endeavour to establish a branch of the Society at Stourbridge, and that the Birmingham friends and himself had great pleasure in coming over to assist their Stourbridge brethren in so laudable an object. Mr. Hudson, at the conclusion of his remarks, which had been listened to with evident interest, called upon Mr. T. Ball, the Organising Secretary, to address the meeting. Mr. Ball dwelt at considerable length upon the objects and benefits of the Society, upon the good work done in the past, and the rapid strides it was making; and he had no hesitation in saying that he should go back to Leeds enabled to inform Mr. Sunter that he might add Stourbridge to their rapidly-increasing list of branches, that being the sixth that had been opened since the last week in January of the present year. At the conclusion of his address, which had frequently evoked applause, the Chairman called upon others who might be desirous to address them or ask questions, to which several responded, and not the slightest hitch took place. The names of those who were desirous of joining were then taken, and a branch of 21 members successfully opened by Mr. Ball, with Mr. J. Calloway as Secretary. Votes of thanks to the Organising Secretary and the Birmingham friends were unanimously carried and responded to, and arrangements made for holding future meetings for carrying on the business of the branch, and the Mitre Hotel decided upon, Mr. A. Barnett, the courteous proprietor (who was at one time a knight of the footplate), having promised every facility possible.

———

PONTYPOOL BRANCH,

8.0 p.m. *June 17th*, 1888.

MR. EDITOR,—DEAR SIR,—The above branch was opened prompt to time. This being the June quarter night, all the officers were in their places in good time, together with a splendid attendance of members. The minutes of last meeting read and passed. The other business was proceeded with. First, a new member proposed and accepted. The next question brought before the branch—Should there be an orphan fund established or not? After the question had been discussed at some length, and everything appertaining thereto fairly thrashed out, it was proposed, seconded, and carried by a large majority, that it was necessary to establish an orphan fund for the benefit of those members that were not provided for in that direction. It was proposed, seconded, and carried—That it should be optional with members whether they belong to the same or not, with suggestion that the contribution should be 1d. per week. I have further to acknowledge the receipt of June *Journals* and Balance-sheets to hand in due time. I can honestly say I never sat at a better conducted meeting before, the business of a quarterly meeting being very heavy to go through in so short a time. It did not on this occasion seem any trouble to get over the work. Everything seemed to work with perfect harmony, all members fairly keeping their places until the close of the meeting. I should not be sorry if the *Journals* were issued fortnightly instead of monthly; for I attribute the great success of conducting our quarterly meeting to the influence of our *Monthly Journal*. I would, as Secretary, through the medium of your valuable *Journal*, take this opportunity of thanking one and all of the officers and members for their valuable assistance in conducting this meeting to a successful issue. I have every reason to believe that I shall be able to report the future proceedings in the same way. Kindly thanking you for space for this insertion,

I remain, yours fraternally,
SECRETARY.

———

RETFORD BRANCH,

June 20th.

SIR,

I am pleased to inform you that two new members were proposed and accepted at our last monthly meeting.

I am, yours truly,
C. STOCKDALE,
Secretary.

———

LEEDS BRANCH.

SIR,

Our last monthly meeting was pretty well attended, and the proposed Orphan Fund favourably discussed, and three new members enrolled.

Yours fraternally,
BRANCH SECRETARY.

———

GRIMSBY BRANCH.

SIR,

I am glad to inform you that we keep steadily increasing, and our last meeting was a good one, and one new member admitted.

I am, yours respectfully,
J. C., Sec.

◆

BRANCH MEETING HOUSES.

Sheffield.
Albion Inn, Johnson Street, Wicker. Alternate Sundays.

Pontypool.
Hanbury Hotel, Griffiths Town, Newport, Mon.

Neath.
Three Cranes Inn, Wind Street, Neath. Alternate Sundays, at 7.30 p.m.

Leeds.
Prince of Wales Hotel, Mill Hill. Last Monday in month, at 11.0 a.m.

Liverpool.
American Tavern, Byrles Street, Toxteth Park. Held fortnightly.

Bradford.
Granby Hotel, Union Street, Bradford. First Sunday in month.

Llanelly.
Neptune Hotel, New Dock, Llanelly.

Sandhills.
Brown Cow, Walton-on-the-Hill. Alternate Sundays.

Swansea.
Monthly—Landore Coffee Tavern. Saturday, at 8.30 p.m.
Quarterly—Oram's Coffee Tavern, Wind Street, Swansea.

Nottingham.
Mission Room, Queen's Walk, Nottingham. Every Monday at 8 p.m.

Bristol.
Phœnix Hotel, Totterdown. Every fourth Sunday at 7 p.m.

Plymouth.
At Mr. Sleeman's, 31, Hortwell Street. Last Sunday in Quarter at 6.30 p.m.

York.
Adelphi Hotel, Railway Street, York. Alternate Sundays at 8 p.m.

Paddington.
Builders' Arms, Westbourne Park, London. Every third Sunday.

Newport.
New Bridge Inn, Bridge Street. Alternate Sundays, from May 6th.

Bow.
City Arms, Devons Road, Bromley. Fortnightly, on Fridays.

Openshaw.
Drovers' Arms, Ashton Road, Openshaw. Alternate Sundays at 7.30 p.m.

Mexborough.
South Yorkshire Hotel, Mexborough. Last Sunday in the month at 7.0 p.m.

Stockport.
Nicholson's Arms, Lancashire Hill. Last Sunday in the month at 6.30 p.m.

King's Cross.
The City of London, York Road, Cattle Market, London. Monthly.

Birmingham.
Small Heath Hotel, Coventry Road. Alternate Sundays.

Battersea.
The Two Brothers, New Road, Battersea, London.

Retford.
Oddfellows' Arms, London Road, South Retford. Monthly at 8 p.m.

Lincoln.
Arcade Coffee Tavern, Lincoln. Last Sunday in the month.

Stratford.
Railway Inn, Angel Place, Stratford, London.

Wolverhampton.
Gladstone Inn, North Road, Wolverhampton. Meetings held monthly.

Grimsby.
Friendly Society Hall, Lower Spring Street. Alternate Sundays at 10 a.m.

Birkenhead.
Borough Hotel, Birkenhead. Meetings alternate Sundays.

Reading.
Blagrave Arms, Blagrave Road, Reading. Meetings fortnightly.

Blackburn.
Dolphin Hotel, Blackburn.

Peterborough.
Pavilion Hotel, Park Road.

Stourbridge.
At Mr. Barnetts, The Mitre Hotel, Stourbridge.

Manchester.
Tower Hotel, Cathedral Yard. Every alternate Sunday at 7.0 p.m.

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Liverpool
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Stockport
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LOCOMOTIVE ENGINEERS AND FIREMEN'S

Monthly Journal.

"*This that they call Organization of Labour is the universal vital problem of the world. It is the problem of the whole future for all who will in future pretend to govern men.*"—THOMAS CARLYLE.

"*I know no better definition of the rights of man:—Thou shalt not steal; Thou shalt not be stolen from; what a society were that*—PLATO'S REPUBLIC, MORE'S UTOPIA, *mere emblems of it! Give every man what is his—the accurate price of what he has done and been—no more shall any complain, neither shall the earth suffer any more.*"—THOMAS CARLYLE.

VOL. 1. AUGUST, 1888. NO. 7.

JACK AND JILL.

YOU ask me to tell the story of the great picture in the parlour, my dear. Well, it all happened when I was a girl of eighteen, very like yourself. How time passes along, to be sure! You often remind me of it all. Perhaps it may do you good to hear how foolish your grandmother used to be in those days, for I have noticed lately that you hold your head rather high, as though the doings of the sweet old farm were far beneath you; and you sneer at Jeft Martin, with his honest heart and honest sunburnt face. Ah! well, I'll begin.

I remember I was sitting on the top of the farm-yard gate, as you like to sit, with my toes turned dexterously behind one of the bars to keep myself balanced. I was fully conscious of looking pretty in the simple muslin frock, with an apron to match tied on with cherry-coloured ribbons. My hair was very yellow, my eyes were very blue, and my cheeks were a wondrous healthy pink; and, well in fact, I was altogether more than satisfied with myself. Besides all that, I had been assured by the protestations of Mr. Gordon Dene—who had taken our north parlour for the summer months, in which to paint a great picture—that I was a "mountain harebell;" and he had actually taken a sketch of me one morning as I stood with a pail of spring water in my hand; I wished he had let me have my best dress on, certainly, for my skirt was tucked up, and my sleeves turned up above my elbows, my hair was rough and peeping all out from under the large straw hat I had plaited myself. He called it beautiful, and afterwards I found he had put me into the great picture. I pouted all the morning at being caught like that, but who would have thought he would be out at six in the morning, when usually he slept until nine or ten.

It was Sunday evening when I sat on the gate. Everybody but cousin Mat, Mr. Gordon, and I, had gone to church. Mat was not a cousin in reality, for his parents had adopted me when I was a little child, and taught me to call them Uncle and Aunt Yates. Dear kind souls they were.

Mat was very tall, broad and strong; his hair was shades lighter than his face, which used to annoy me. I prided myself on my taste in those days.

Mat had sulked all day, and would lie on the kitchen settle with a book. I felt sure he was not reading, so I went out to my place.

There I could watch the old sun go down behind the band of trees at the other side of the great cornfield, as you know. The wheat had been got in early that year, and I remember the field of stubble shone like gold in the mysterious light.

And all the time a rich voice was singing snatches of songs in the orchard, and the scent of a cigar floated past me. Mr. Dene had slung up a hammock under the apple trees, and there he loved to lie and dream.

He had well nigh turned my silly head with his smiles and flattery ; so much so, that I had grown to look upon Mat as coarse and ignorant in the extreme, although he always looked well on horseback, and had been much better educated than any other farmer's son in the district.

But the dreamy, soft manner of Mr. Dene was altogether new to me, and I began to think that, after all, I was perhaps superior to the old farm people, and that I might have graced the big house on the hill yonder, or even the houses in London of which Mr. Dene had spoken, where ladies were always dressed in beautiful clothes and moving among lovely things.

The song in the orchard continued. It was about "warm light in dark eyes," I remember.

"Ah, how beautiful it sounds," I murmured. "Now, if Mat had been singing, he would have sung an old hymn, being Sunday. How different the life Mr. Dene lives to ours ; I'm tired of it.

I clasped my hands on the muslin apron and sighed ; then there crept over me a chilly foreboding of coming sorrow. I heard a step, half-fearing and half expectant. I turned only to meet Mat's sunburnt face and clear eyes.

I shrugged my shoulders, and turned my face to the cornfield again.

"Judy!"

"I wish you wouldn't call me that any more ; why can't I be called my proper name, Judith : I'm sure it is much nicer."

"Well, Judith, then," he said meekly, "only it sounds a long way off, and cold. I want to say something, if you'll listen."

"I'll listen, of course," I answered pettishly.

"We used to be very fond of one another," he said at last, in a subdued voice.

"Well, we are yet, ar'n't we ?"

Then the sounds from the orchard came dreamily past again, but this time the words jarred upon me :—

And what is your fortune, my pretty maid ?
Pray what is your fortune, my pretty maid ?
My face is my fortune, sir, she said.

I began to talk hurriedly, not wanting to hear the end of the detestable old song, for I never liked to hear it in those days. I also thought I saw a smile round Mat's mouth, and I felt much annoyed.

"Yes, we used to be fond of one another before that fox came in, confound him."

"For shame, Mat ; on Sunday too," I said demurely ; he is not a fox, he's a real gentleman : see how he can paint ; besides you ought to be grateful, when he's put you into the picture as well as me. I saw it the other day ; you are mounting the hill, with a red sun like that shining behind you, and all over the cornfield below ; it's splendid ; and you are looking into my face. I am standing on a mossy stone a little above you, with a pail in my hand just like I was that morning. I do wish he had waited till I was dressed like I am now," I said tossing my head.

"Perhaps you would not feel so conceited if you knew what I know," said Mat, quietly,

"What, pray ?"

"The title of the picture."

"He would never tell you before me, Mat."

"No ; but last time I went to the market I was looking at a London paper, in the Green Lion, and read this—'We hear that Mr. Gordon Dene is rusticating in a remote hamlet, busy with his next Academy picture ; subject, "Jack and Jill went up the hill."' So you see I'm Jack and you're Jill."

I was speechless a minute ; then I gave Mat a stinging box on the ear, Sunday though it was, and descended with as much dignity as was possible under the circumstances.

I went into the house raging ; my head was giddy.

After a little time I went out again towards the orchard, for I heard loud angry voices under the apple boughs. I went nearer, and saw Gordon Dene, with clenched fists and white lips, looking into Mat's sunburnt face ; and frightened though I was, I thought instantly how handsome both men were, each in his own way.

"Cad," hissed Mr. Dene.

"Fox," gasped Mat.

All on the Sunday evening it happened.

"Take that, howling cad," said the artist again, slapping Mat on the cheek, as I had done a short time before.

"And that, you sneaking cur," roared Mat.

It was only one blow, but it was like the blow from a sledge hammer on Gordon's temple, and he fell like a log at our feet.

The soft light rested on his set, white face, turned up, among the fallen apples in the grass. I sprang forward with a shriek.

"Mat; you have murdered him."

"Silence, girl," he said, gripping my arm unmercifully, and throwing me from him, and I stifled my screams, in my muslin apron, until Mat had cleared the gate, and was going away, over the cornfield, looming against the glory of the western sky.

I did not know much more, until after help had come, and Gordon Dene had been lifted on to the best bed, in the whitewashed room. He was not dead, but there were long weeks of nursing before us.

It was a very weary time which followed. My heart used to go after poor Mat in the loneliness of the nights, wandering away with the horror of murder on his innocent soul.

I grew to be a slave to Mr. Dene. When he began to mend he was so weak and childish that I was drawn nearer than ever to him. I used to watch for the slightest sign of a wish and run about like a squirrel. Sometimes I could see that Aunt Yates thought it was strange I was actually able to laugh, though Mat was still a wanderer.

I remember sitting by the parlour window one afternoon late in November, looking over the bare country. I saw once more the looming figure against the sky as I saw it last, and I sighed aloud to think of poor Mat, with the horror of his deed upon him yet.

"Judy."

I slowly approached the couch from whence the voice came.

"When I am strong again I will never rest until I have found him and sent him back to you," he said softly.

I looked down into the handsome face and said hurriedly, "Oh, Mr. Dene, I don't want him for myself, it's for his poor parents." Then I covered my face with my hands.

"Judy, have I spoiled both your innocent, good lives, just for my own fun and amusement? I wish I had never come."

I did not answer, I was spell-bound. A great castle in the air was crumbling before my helpless gaze.

There was a different look in the splendid eyes of Gordon Dene now to the laughter-filled glances of the past, and I felt that all young gladness was being swept away from me. It had almost gone, that Sunday night in September; but it ebbing faster with the twilight of this November afternoon.

"Did I ever show you this Judy ? Take it to the window. I think there is light enough to see it by."

He put a small morocco case into my hand. I crept close to the light and looked into a wonderful face, painted on ivory; soft lace was swathed round a perfect neck, rosy lips parting on little pearly teeth, and large, dark, deep eyes looked from beneath a tangle of rich brown hair.

I stood a long time in silence. My pride was humbled at last. Could this lovely creature have been made into Jill, who mounted the hill in the long ago?

Never; this face was as far removed from mine as a star above the earth. My pride, though humbled in one way, seemed to grow in another, for I walked across the room with a truer dignity than I ever assumed before, and put the case back into the thin white hand.

"She's wonderfully beautiful," was all I could say.

"Yes," he murmured, "she's my fair lady, Maud."

When the summer came again everything fell into a dead monotony. Mr. Dene had long since gone away, and there was nothing but the sad faces of the two old people, and things came to the same times until I used to think I was going mad.

I would sit in the hammock Mr. Dene had left for me and read the occasional letters he wrote to me—descriptions of wonderful places and people, which filled my heart with longing to see them. He always ended his letters by saying, "I feel sure that Mat will turn up yet. I have advertised far and wide. He must see it sometime, Little Judy."

One Sunday evening in early autumn I was alone in the old house, standing within the wide kitchen doorway. I had given over perching on the gate; I felt older and more sedate.

After a time I became conscious of a face looking through the hawthorn hedge, and slowly I realised it was a brown face, with very light hair and clear eyes. Then a tall strong manly figure came through the gate and held out both hands to me, and in another minute I was crying, sobbing, and laughing on Mat's broad chest, and the monotony and loneliness seemed to have all flown away.

So, my dear, that was how the picture came to hang in the parlour among the paintings of favourite horses and dogs. Mr. Dene sent it the following spring, when Mat and I were married.

And often when strangers read the title "Jack and Jill went up the hill," and turned to ask if it really was the original, great painting, your grandfather used to say proudly, "Yes; it is a present from the artist to my little wife Judy," when we used to smile at one another knowingly.

That's the end of it, child. Always remember that although you may have a pretty face and may attract much attention, you are only "Jill" after all, like your grandmother Judy. FLO. JACKSON.

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Scientific.

LOCOMOTIVE BLAST-PIPES.

Thanks to the blast-pipe, the locomotive became a reality; the tubular boiler alone was one of the main features of the rocket, but without the blast-pipe, Stephenson would not have won the day at the Rainhill contest in 1829, one of the most glorious dates in the history of mankind.

For many years the blast-pipe consisted simply of a pipe, the upper end of which opened into the chimney, and had a slightly contracted area.

Of course the progress made in the construction of locomotives led engineers to enquire which would be the best form, position, and dimensions to be given to the blast-pipe.

There are at present three distinct kinds of arrangements of the blast-pipe, namely, the English, the Continental, and the American.

In the English the blast-pipe terminates a little above the upper row of the boiler tubes. This is the result of trials made by Mr. R. Peacock, on the Lancashire and Yorkshire Railway many years ago.

In the Continental practice the rule is to carry the exhaust pipe much higher than in English locomotives; generally speaking, the blast-pipe opens immediaely below the base of the chimney.

In the American practice the exhaust pipes open a little above the bottom of the smoke-box, and into a cylindrical pipe suspended in the smoke box, and called the "petticoat pipe."

Now that we have three different arrangements of the blast-pipe, the question that will be asked is, which is the best?

We cannot, unfortunately, produce the result of conclusive experiments made with these apparatus, for none of an extensive character have yet been made. But it is easy to see by reasoning that each of the arrangements has its advantages and defects.

We must, however, remind our readers that theory is here of no avail, and that facts of a practical nature will alone prove which arrangement is to be preferred.

A good blast-pipe is that which will cause each tube in the boiler to do its share of work; in other words, a good blast-pipe is that which will ensure as nearly as possible that each tube shall have the same evaporating power.

Now, it must be remarked that the blast-pipe and chimney are nothing but a large ejector, and that in order to obtain the best arrangement, we must proportion our ejector so as to draw the greatest quantity of air possible, not from the smoke-box, but from the fire-box through the tubes.

In the injector we increase the efficiency by increasing the extent of the surfaces of contact between the steam and water. Similarly in ejectors, we must increase the contacts between the issuing steam and the gases to be evacuated, so as to increase the friction, by virtue of which the gases are evacuated.

Now, it appears that in English locomotives the central tubes do the most work. In Continental engines, the fire box top and the top row of tubes wear more quickly than in English engines.

In American engines the bottom tubes seem to do the most work, however, not to the same extent as the central and top tubes in the respective previous arrangements.

In each case the lateral action of the exhausting medium seems to be maximum for the masses of air nearest to the orifice of the exhaust.

The action of the exhaust on all the tubes is not, therefore, distributed equally amongst the tubes.

On the other hand, the greater the velocity of the gases to be exhausted at the moment they arrive in contact with the steam the greater the efficiency of the blast. Now, this condition is not realised in either of three systems, for none of them realises the condition of the extended or multiplied contact with the steam, and the distance of each tube to the blast orifice is a different one. An arrangement consisting of a petticoat pipe formed of inverted funnels placed one at some distance above the other has been tried with success in America. Each of these funnels acts like the nozzle of an improved injector, and performs its work on two or more horizontal rows of tubes. This is decidedly an improvement in the right direction.

In this country a successful attempt to improve the blast pipe has been made by Mr. W. Adams, Locomotive Superintendent of the London and South-Western Railway. Before explaining the principle of this improvement, known as the "Vortex Blast-pipe," we must remind our readers that in order to increase the efficiency of the blast the annular form has frequently been given to the blast orifice so as to enlarge the surface of contact between the air and the gases to be evacuated. This arrangement could not be much better than the ordinary blast-pipe, owing to the varying distances of the tubes. Mr. Adams connects the central part of the annular blast orifice with a kind of scoop, the concave side of which is turned towards the tubes. Through the action of the annular jet of steam, a vacuum is created in the scoop, and the gases from the tubes rush into it and mix together so as to be exhausted simultaneously. The scoop permits the rarefaction of gases to localise in the smoke-box in such a manner that all tubes have an equal or rather a more equal share of work to perform. This device was successful, for it effected a saving of 2 lbs. per mile in the coal consumption of engines to which it was applied.

The great inconvenience of these well-meant arrangements is that they render the cleaning of the tubes more difficult, that when they have been once removed for this purpose, they may not be placed again in their proper position, which would impair the action of the draught.

Nevertheless, this drawback can be overcome, it is only a constructive detail, the realisation of which can but stimulate the inventive genius of our engineers.

To sum up, blast-pipes must be built so as to offer the greatest possible area of contact between the exhausting steam and the gases, and to localise the rarefaction of the gases in the smoke-box to the entire exit area of the gases, namely, the ends of all the tubes in the smoke-box; it will be seen that the arrangement of the blast-pipe as adopted on the continent has the great disadvantage of creating the vacuum in the smoke-box, *but not in the tubes directly, as it should be,* whereas the fault of the ordinary English and American arrangement is to cause a particular group of tubes to do more work than another.

Considering the successful character of Mr. Adams's trials, we hope to see this question taken up by some other locomotive superintendent in this country, and other valuable improvements made in the blast-pipe in the direction we have pointed out in this article.—*Railway Herald.*

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THE AGE OF LOCOMOTIVES ON THE NORMAL GAUGE RAILWAYS OF GERMANY.

By M. Leonhardt.

The number of engines in use on German railways at the end of the railway year 1884-85 was 12,098, and at the end of the railway year 1885-86 was 12,450. The cost of these engines is given at 581,097,313 marks and 588,551,463 marks; or the cost per locomotive, including tender, 48,033 marks in 1884-85, and 47,273 marks in 1885-6—£2,400 and £2,363 respectively. During the past year the total number has been increased, but only 33 new engines have been added. The mean age of the locomotives in use during the year of service 1884-5 was 12·60 years; and in 1885-6 15·49 years. This is deducted from a table of the number of engines added and in active use for each year from 1843 to 1885. From this table it follows that 59 engines built prior to the year 1850 were running during the year 1885-6, and that the distinction of being the oldest running engine in Germany falls to one on the Holsteinische Marshbahn, which dates back to 1845. An examination of the table shows also that the average number of engines still extant is under one hundred for each year prior to 1857; from 1858 onwards the number rises steadily. Thus, in the year 1885-6 there were still 210 locomotives which began work in 1864. In the next few years the increase in numbers is still more rapid, and reaches in 1874 a maximum of 1,478 for the year 1884-5, and 1,464 for the year 1885-6. From 1878 until 1880 there is a steady decrease, which attains the minimum in the latter year. There are 131 engines of 1880 in 1884-5, and 132 engines of 1880 in 1885-6. The subsequent numbers again rise to over 500 for 1883; thus there were 517 engines which began work in 1883 in use during 1885-6.—*Mechanical World.*

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PRINGLE'S SINGLE ECCENTRIC VALVE GEAR.

Ever since the link motion was invented—we should say more correctly, ever since the locomotive took on the railways the place it has ever occupied since 1829—inventors have tried to invent some simple, durable, and effective device, whereby an engine could be not only reversed, but made to exert such power as would correspond to the exigencies of the line and load. The ordinary link motion is a very serviceable apparatus; it is not perfect, but it answers pretty well all the demands of the present time. Nevertheless, it is too complicated in this sense, that it requires two eccentrics, and that the latter being the source of a comparatively high friction, wears away much more quickly than an equivalent crank pin and brasses would. The link motion does not give always equal and symmetrical motion of the slide valves for both strokes of the piston in whichever direction the engine is made to run. Various engine builders and engineers have attempted to simplify the link so as to obtain a more equal distribution. We may name, amongst others, Heusinger von Waldegg, Walschaert, Stévart, Brown, Joy, &c. But these attempts are not a complete success, and are, as a rule, limited to locomotives. In some cases their motion is geometrically exact, but this is obtained at the expense of the simplicity of the gear, in other cases the gear is too sensitive to the imperfections of the rough road.

We have had for some time before us two models of a single eccentric reversing and controlling valve-gear, which meets, in our opinion, all the desiderata of a good gear, namely, simplicity, equality, and symmetry of the various phases of the valve motions and distribution.

We have investigated the properties of this gear by mathematical calculations, and must pronounce it a first-rate invention. We will give here a brief explanation of the principle of its construction. We may first mention that it is the invention of Mr. James Pringle, of 159, West Scotland Street, Kinning Park, Glasgow, who has obtained a patent for it in this country. Let us suppose an eccentric pulley keyed without angular advance on the driving shaft of an engine, and further, that this eccentric pulley is embraced by a constrained vertical or horizontal frame (as the case may be), and that this frame is connected by a suitable rod to the slide, the latter will be imparted a to and fro motion, the extent of which is twice the eccentricity or throw of eccentric. Let us now suppose that, by some means, the frame from vertical becomes oblique, so as to form a certain angle with the horizontal, or rather the direction of the valve rod, the result will be a larger travel of the valve, the maximum distance of the latter from the centre of the valve face occurring when the diameter of the eccentric is perpendicular to the frame sides. Now, for each different angle of inclination of the frame sides in the horizontal, we obtain a different travel and altered distribution phases. As the said angle increases the travel increases, so that we can, by a single diagram, find the suitable proportions of the gear for a given distribution; the vertical position of the frame corresponds to the least travel of the valve, the throw must in this case not exceed the lap. We have hitherto supposed that the angle of inclination of the frame is on one side of the vertical, and less or greater than 90° (the angle of the vertical position of the frame sides), but if we make it greater or less than 90°, the motion is reversed, but the valve motion remains perfectly symmetrical, as in the case of the motion in the previous direction. In practice, the frame is simply a large pulley provided with a slot, the sides of which are parallel to a diameter; this large pulley is embraced by a collar provided with two parallel, horizontal, or vertical faces, constrained to move between two horizontal guides fixed to the engine frames. The valve rod is attached to this collar. In order to ensure that the large pulley will obey to the to and fro motion imparted to it by the eccentric pulley, the latter is surrounded in a collar provided also with two parallel face bearing and sliding, against the parallel sides of the slot in the large pulley.

In order to reverse the engine or alter the rate of expansion, the aforesaid large pulley is made to turn a certain angle within its collar by means of a suitable rod and quadrant, &c. The use of this gear is not restricted to locomotives; it can also be applied to all other engines which have to run in both directions.

We have in this gear a simple ingenious means to reverse an engine, and alter its rate of cut-off. It is also very durable, not liable to get out of order, and easily set.—*Railway Herald.*

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Miscellaneous.

STOOPING FORWARD.

Everyone knows that stooping forward, particularly after rising quickly from the bed in the morning, when the stomach is empty and the heart has less than ordinary support from the viscera below the diaphragm, is very apt to occasion a form of faintness, with vertigo, not unlike that which occurs in sea-sickness. We do not at the moment speak of the faintness and giddiness from cerebral anæmia, which are directly consequent upon suddenly assuming the erect after long continuing in the recumbent posture, but of the more alarming sensation of being in the centre of objects which are rapidly passing away, usually from left to right, with loss of power to stand or even sit, and an almost nightmare feeling of inability to call for help or do anything to avert a catastrophe, while throughout the experience the sufferer retains painfully acute consciousness.

This, we say, is familiar as one, at least, of the effects not uncommonly produced by stooping forward under the special conditions indicated. With many other varieties of the vertigo consequent upon heart weakness or cerebral anæmia, observation or experience has made us all acquainted. We cannot, however, help thinking that the consequence of even partial compression of veins of the neck, offering an obstacle to the return of the blood from the head, with its important organs, are not so well recognised. The peculiar form—or, more accurately, the several forms --- of headache distinctly caused in this way when the head is long bowed forward on the chest, bending the neck on itself, cannot fail to occur to every one ; nor will the high tension of the eyeball, the turgid and heavy eyelids, the snuffing nose, the deafness, with buzzing or throbbing in the ears, the heavy breathing and the puffed and perhaps flushed or darkened colour of the face, resulting from the obstructed venous circulation through the bended neck, be forgotten.

There are other and more perilous, though secondary, effects of leaning forward when the heart is weak or the blood vessels are not as strong as they ought to be, which should not be overlooked. Beyond question, the extra strain thrown upon the apparatus of the circulation by anything that impedes the free passage of the blood through almost any part of the venous system is more severe and dangerous than a physically equal strain thrown on the arteries. At least this is so in adult life, and without going further into details in connection with the *modus operandi* of the mischief to which we point, it may be permissible to urge that the subject is one to which attention may be usefully directed.

The weakly, and those who are not unlikely to have hearts overburdened and blood vessels stretched beyond recovery, or even ruptured, should be warned quite as earnestly against suddenly assuming, or too long retaining any postures which do —however slightly and partially—impede the return of blood through the veins. We know how prolonged sitting may cause the veins of the legs to distend and either give way or permit the extravasation of their contents. When this sort of thing happens, even though in trifling degree, in the case of vessels directly connected with such delicate organs as the eye, the ear, and the brain, it is easy to see that the results may be very serious in their character ; and probably few postures commonly taken up by persons who lead somewhat sedentary lives are as prone to do mischief unnoticed as that of leaning forward at work at a table which is not sufficiently high to insure the head being so raised that the veins of the neck may not be in any way compressed or the return of blood from the head embarrassed or delayed. We see reason to believe that if this apparently small matter were generally understood there would be fewer head and heart troubles, and we will go so far as to say that some lives now lost would be saved.

GENERAL REPORT OF THE BOARD OF TRADE ON RAILWAY ACCIDENTS IN THE UNITED KINGDOM DURING THE PAST YEAR.

TOTAL KILLED AND INJURED FROM ALL CAUSES IN THE WORKING OF RAILWAYS.

The total number of persons returned to the Board of Trade as having been killed in the working of the railways during the year was 919, and the number of injured 3,590.

Of the above numbers—121 persons killed and 1,297 persons injured were passengers; but of these only 25 were killed and 538 injured in consequence of accidents to or collisions between trains; the deaths of the remaining 96 passengers and the injuries to 759 are returned as due to a variety of other causes, and especially to want of caution on the part of the individuals themselves.

Of the remainder, 422 killed and 2,075 injured were officers or servants of the railway companies, or of contractors; of suicides there were 70; of trespassers, 203 were killed and 114 injured; of persons passing over the railway at level-crossings, 63 were killed and 35 injured; and of other persons from miscellaneous causes, 40 were killed and 69 injured.

In addition to the above, the companies have returned 58 persons killed and 4.157 injured from accidents on their premises not connected with the movement of railway vehicles.

PROPORTION OF PASSENGERS KILLED AND INJURED FROM ALL CAUSES IN THE WORKING OF RAILWAYS.

The total number of passenger journeys, exclusive of journeys by season-ticket holders, was 733,670,000 for the year 1887, or 8,085,610 more than in the previous year. Calculated on these figures, the proportions of passengers killed and injured during the year, *from all causes*, were in round numbers, 1 in 6,064,000 killed, and 1 in 565,667 injured.

In 1886, the proportions were 1 in 7,637,730 killed, and 1 in 540,674 injured.

PROPORTION OF PASSENGERS KILLED AND INJURED FROM CAUSES BEYOND THEIR OWN CONTROL.

The following statement shows the proportion of passengers returned as killed and injured from causes beyond their own control, in passenger journeys, for the years 1874 to 1887:—

Year.	Number of Passengers Killed and Injured from causes beyond their own control, from Accidents to Trains.		Number of Passenger Journeys (exclusive of Journeys by Season ticket holders.	Proportion returned as Killed and Injured (from causes beyond their own control) to number carried.	
	Killed.	Injured.		Killed,	Injured.
1874	86	1,613	477,840,411	1 in 5,556,284	1 in 296,243
1875	17	1,212	506,975,234	1 in 29,882,073	1 in 418,296
1876	38	1,279	538,287,295	1 in 14,165,455	1 in 420,865
1877	11	664	551,593,654	1 in 50,144,876	1 in 830,713
1878	24	1,173	565,024,455	1 in 23,542,685	1 in 481,692
1879	75*	602	562,732,890	1 in 7,503,105	1 in 934,772
1880	29	904	603.885,025	1 in 20,823,586	1 in 668,013
1881	23	987	622,160,000	1 in 27,050,435	1 in 630,354
1882	18	803	654,838,295	1 in 36,379,905	1 in 815,489
1883	11	662	683,718,137	1 in 62,156,194	1 in 1,032,806
1884	31	864	694,991,860	1 in 22,419,092	1 in 804,388
1885	6	436	697,213,031	1 in 116,202,171	1 in 1,599,112
1886	8	615	725,584,390	1 in 90,698,049	1 in 1,179,812
1887	25	538	733.670,000	1 in 29.346,800	1 in 1,363,699

* Including 73 persons lost in the Tay Bridge Disaster in the year 1879.

† If the journeys of season-ticket holders, which have been estimated for the past year at 140,000,000, are included, the proportions would be nearly 1 in 35 millions killed, and 1 in 1,624,000 injured.

From this table it will be observed that the number of passengers returned as killed *from causes beyond their own control* which was 8 in 1886, was 25 in 1887. The increase in the latter figures is entirely due to the collision at Hexthorpe, no other accident to trains having proved fatal to passengers during the year. The number of those injured has decreased from 615 in 1886 to 538 in 1887.

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UNLOVED BECAUSE UNLOVELY.

It is an axiom that if you are not loved, it is because you are not lovely, not because one does not wish or is willing to love you, if you allow it to be a possible thing. A mother loves her crooked and crippled child, snarl it ever so unwisely; a wife clings to her husband through infinite misbehaviour and unkindness; a husband cherishes a wife whose tattered nerves make life a burden to him; but in other relations of life something more is required on the other side in order to continue the love that is given in the first place. Even twin sisters are capable of bitter estrangements, and when the brothers and sisters of a family refuse to quarrel, they often feel only the ties of blood which give a certain nearness without any accompanying enjoyment; they do not love, but they pity; and they love, not these unlovely ones, but the past and the people with whom these unlovely ones are necessarily associated in mind and memory. For these unlovely ones not only give no pleasure by their society, but are the means of absolutely hindering it; and when you are not only negatively unlovely, but positively unpleasant, what have you the right to expect?

People who do not curb their temper at any pretence whatever, who go about in perpetual fear that somebody may try to impose upon them, and full of so strong an intention to hinder any such imposition that they themselves become the ones really guilty of imposition; who demand the best of everything, and make inquisition as to whether they are getting it or not; who always require the first place, the chief attraction, the best service, and show an uncontrolled and unreasonable anger if by any chance it is either refused them or they do not happen to receive it; who eagerly retail the quick and not even half-meant remarks of one hot-headed member of the family to another, if not from selfish motives, then from pure love of mischief and stirring up of strife; who abuse the servants, where there are servants, and have to be waited on by others where there are not; who keep the whole household in a constant state of irritation, and on the alarm for their outbreaks and their moods; whose lives are, in truth, one tissue of selfishness—how is it that such people can expect love, or dare to blame the universe that they do not get it? Even were one inclined to blame the universe for their existence, for the creation of that condition of nerve and brain and heart under which they are born or brought, one would have to remember that no such condition can arrive except by the breaking of laws by somebody, and they only represent in another fashion the wrong-doing of some ancestor, if not of their own.

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THE FIRST SPURIOUS BANK-NOTES.

The production of a spurious bank-note was first accomplished in 1758, by one Richard Vaughan, a linen draper, in Stafford. The bank had been going on for sixty-four years without ever experiencing the slightest trouble or apprehension in the matter, and would probably have gone on for many years more but for the ambition of this man to impress his fiancée with a show of his wealth. He handed over to this lady a considerable sum in bank-notes, all of which turned out to be his own manufacture. So novel and original a method of making a fortune would have been successful but for the awkward interference of one of the engravers whose services had been engaged upon one part of the note. He communicated with the authorities, and Mr. Vaughan's enterprise came to a tragic end.

MARRYING AND GIVING IN MARRIAGE.

SOME STRANGE CUSTOMS.

We are in the habit of fancying ourselves prosy, commercial people, but, after all, there is more romance and love amongst the English-speaking race than in all the rest of the world. One of the popular errors of the day is to think that we are getting more mercenary, and that the question of money enters more largely into the marriage contract now than formerly with us. Such belief is an error, according to Thomas Stevens, writing in the New York *Sun*, just the same as it is a a mistake that the world is growing wickeder instead of better. Both in England and America there are more romantic marriages to-day, in proportion to the population, than ever before, although there has of late been a decrease in the proportion of marriages. In the East marriages are usually arranged and negotiated by go-betweens or mutual friends. In some countries, where would-be brides are plentiful, and the eligible young men are correspondingly scarce, the papa of the girl is expected to enhance her value with a substantial dowry. In other countries where the proportion of young men and maidens is the reverse, the man practically has to purchase the bride before he can lead her to the altar. This system prevails to a great extent in Bulgaria, where the prospective husband is required to hand over to the bride's father a sum of money varying from a hundred dollars to several thousand, according to his means. The Bulgarians are a thrifty folk, and among the peasantry this money is understood to reimburse the father for the loss of his daughter's services in the fields. She is regarded as a field hand whose labour is worth a certain amount; the aspirant for her hand pays over the stipulated sum, and secures at one stroke a thrifty wife and a willing farm hand for his own fields. The sum of money the groom is to pay over to the father at the marriage is agreed upon, and the quantity and quality of the bride's trousseau is duly expatiated upon and set down in the agreement. Sometimes, when the prospective groom is poor or the father of the young woman hard-hearted and exacting, these engagements last for years, because the inability of the young man to procure the stipulated amount and the unwillingness of the girl's father to lose her services in the field. After the bethrothal, however, the young people are permitted to bill and coo within the limits of Eastern propriety, and if the Fates presume to use them too harshly, they sometimes accomplish their happiness by an elopement.

In Turkey everybody marries young, and one might perhaps be permitted to add those who can afford it marry often. Such a thing as an old maid is absolutely unknown among the Turks. They are a marrying race, and as a general thing the girls are married off by the time they reach their teens, and often a year or two before. A Turk may possibly fall in love with his wife after marriage, but it wouldn't be very easy for his affections to antedate this ceremony; for the first time he ever sets eyes on her face is in the nuptial chamber, after the wedding guests have retired.

When a young Turk becomes old enough to marry, then his mother and a few confidential female friends undertake to find him a wife. In a body they call upon such of their neighbours as are blessed with marriageable daughters, and state their mission in a business-like way The daughters are trotted out for inspection much as though they were young colts or calves offered for sale. The wife-hunters look the daughters over critically, question the mother, and partake of coffee. In a few minutes the daughter that has been inspected retires from the room. If her appearance has failed to please the visitors, nothing more is said. If, however, they are favourably impressed, they linger and enter into negotiations for her hand in marriage to the youth in question. The girl's age, health, accomplishments, trousseau, and kindred matters are inquired into in the most matter-of-fact way. The mother of the damsel, on her part, inquires quite as minutely into the merits and demerits of the proposed husband. The inspectors depart after mutual well wishes over cigarettes and coffee, promising to call again Meanwhile the young Turk, who has probably warned his mother beforehand that she must pick him out a beauty, is awaiting her return in a speculative mood. "What luck has Allah ordained, O my mother?" he says as she returns home and seeks him out. "Aman! oghlon," says the fond mother. "Allah has revealed for you a wife, a black-eyed houri, lovely as the peris in the garden of Mohammed."

In Persia, as in Turkey, if a husband wishes a divorce from his wife, all he has to do is to order her out of the house. As a check upon the too free use of this arbitrary proceeding, however, the Persians have constituted a very curious and ingenious custom. While the Mohammedan law makes it so easy for a husband to put away his wife, it secures to her all her own property. Under no consideration can the husband deprive the wife of her own property. As a precaution against divorce, then, the husband in the marriage contract is usually required to promise a considerable sum of money as a wedding gift to his bride. This money is not forthcoming at the wedding, nor expected, but it is placed to the wife's credit as a debt owed to her by the husband. As, in case of divorce, this money would have to be paid over, the amount is usually made so large that it is virtually beyond the husband's means. In that case divorce to him would mean financial ruin; and as the Persian's pocket is the most susceptible part about him, it follows that there are few divorces in Persia.

Among the Afghans marriage is a case of purchasing the bride. A rich Afghan marries early, simply because he can afford to pay for a wife, while a poor one often remains single until middle life on account of his inability to purchase. If the husband dies, and the widow wishes to marry again, she or her friends have to refund the purchase money to the friends of the dead husband. A common custom is for the brother of the deceased to marry the widow. No other person would think of wedding her without first asking his brother's consent.

In China early marriages are the rule. The match is arranged by the parents, and is in the nature of a commercial transaction. The groom is expected to make presents of money and clothes to the bride, who, however, brings no dowry or anything in return. The calendars are consulted solemnly for lucky days. and the blessings of the tutelary gods sought by various propitiatory measures. If the signs fail to turn out auspiciously, the wedding is postponed again and again. The ceremony of marriage consists in drinking a cup of samshoo together in the nuptial chamber.—*Star.*

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CAST A LINE FOR YOURSELF.

A young man was listlessly watching some anglers on a bridge. He was poor and dejected. At last, approaching a basket filled with wholesome-looking fish, he sighed: "If now I had these I would be happy; I could sell them at a fair price, and buy me food and lodgings."

"I will give you just as many, and just as good fish," said the owner, who had chanced to overhear his words, "if you do me a trifling favour."

"And what is that?" asked the other.

"Only to tend to this line till I come back; I wish to go on a short errand."

The proposal was gladly accepted. The old man was gone so long that the young man began to be impatient. Meanwhile the hungry fish snapped greedily at the baited hook, and the young man lost all his depression in the excitement of pulling them in; and when the owner of the line returned, he had caught a large number. Counting out from them as many as were in the basket, and presenting them to the young man, the old fisherman said: "I fulfil my promise from the fish you have caught, to teach you whenever you see others earning what you need, to waste no time in fruitless wishing, but cast a line for yourself."—*Christian Advocate.*

Interesting Extracts.

VEGETABLE CLOTHING.

About two hundred years ago the Governor of the Island of Jamaica, Sir Thomas Lynch, sent to King Charles II. of England, a vegetable necktie, and a very good necktie it was, although it had grown on a tree, and had not been altered since it was taken from the tree. A gentleman who witnessed two natives manufacturing this lace thus describes it: A tree about twenty feet high and six inches in diameter, with a bark looking much like that of a birch tree, was cut down. Three strips of bark, each about six inches wide and eight feet long, were taken from the trunk, and thrown into a stream of water. Then each man took a strip while it was still in the water, and with the point of his knife separated a thin layer of the inner bark from one end of the strip. This layer was then taken in the fingers and gently pulled, whereupon it came away in an even sheet of the entire width and length of the strip of bark. Twelve sheets were thus taken from each strip of bark, and thrown into the water The men were not through yet, however, for when each strip of bark had yielded its twelve sheets, each sheet was taken from the water, and gradually stretched sidewise. The spectator could hardly believe his eyes. The sheet broadened and broadened until, from a close piece of material six inches wide, it became a filmy cloud of delicate lace over three feet in width. The astonished gentleman was forced to confess that no human-made loom ever turned out lace which could surpass in snowy whiteness and gossamer-like delicacy that product of nature. The natural lace is not so regular in formation as the material called illusion, so much worn by ladies in summer; but it is as soft and white, and will bear washing, which is not true of illusion. In Jamaica and Central America, among the poorer people, it supplies the place of manufactured cloth, which they cannot afford to buy; and the wealthier classes do not by any means scorn it for ornamental use. The tree is commonly called the lace-bark tree. Its botanical name is *lagetto lintearia.—St. Nicholas.*

* * *

STORY OF THE ARMADA.

Two historical anniversaries fall in the present year—the bi-centenary of the "Glorious Revolution" and the tercentenary of the utter defeat of the so-called "Invincible" Armada, which Philip II. sent from the shores of Spain with the view of subjugating this country. The latter event was celebrated on Wednesday at Plymouth, which may be regarded as the home and nursery of the British navy. The account of the sailing of the Spanish fleet, and of its defeat and dispersal by the efforts of our great sea-captains of the day, as well as by the interposition of Providence, necessarily occupies a prominent page in English history, and is familiar to every student. The commemoration of the event will, if it serve no other purpose, draw attention to the serious danger which threatened our country, and also rouse in the breast of every true Englishman grateful feelings to the men who by their skill and courage preserved us from the Spanish yoke. Charles Kingsley, in "Westward Ho!" points out how deep a debt of gratitude we owe to these men. Other writers, foreign as well as English, have shown the great importance, not only to England, but to Europe generally, of the action of Drake and his compatriots in warding off the danger which threatened this land. There can be no doubt that the defeat of the Spanish Armada saved France and the Netherlands as well as England.

Never were the preparations for an invasion made on so extensive a scale, and never did complete disaster come so speedily to an imposing host. Philip had collected a fleet of 149 ships of war, the most formidable of which were sixty-five great galleons. There were also four galleys, four still larger galleasses (each armed with fifty guns), fifty-six armed merchantmen, and twenty pinnaces. The Armada was provided with 2,500 cannon, and there were on board the ships 8,000 seamen and 20,000 soldiers. At first sight, with such an imposing array, the Spaniards might well designate their Armada "Invincible." But, as the result proved, battles are not always won by the numerically stronger force. It was the misfortune of Spain to possess an unmanageable fleet, and to have at its head a man who knew very little of seamanship. The Duke of Medina Sidonia, who had supreme command, had a number of high-sounding titles, one of which was "Captain of the Ocean Sea." He was a grandee of the purest blood. But noble birth and high-sounding titles did not make up for lack of knowledge of maritime matters, and Spain had to pay the penalty for embarking in one of the rashest enterprises that history records. Among the 20,000 soldiers were 2,000 grandees and 300 friars and inquisitors. The last-named individuals carried with them their instruments of torture, or, as they doubtless termed them, instruments of "conversion." These included whips, fetters, thumbscrews, &c. What would have taken place had the force effected a landing and defeated our brave defenders, may therefore be easily guessed.

The fleet set sail from Lisbon on the 18th, 19th, and 20th of May, but a storm off Finisterre drove it back to Corunna, whence it sailed on July 12th. Although the preparations for the invasion had occupied a considerable length of time, it was late when the real danger was fully credited in this country. Three armies were hastily collected—one of 30,000 to guard Queen Elizabeth, one of 20,000 to protect the south coast, and a third in the camp at Tilbury. We are glad to be able to record that patriotism proved stronger than religious fanaticism in the hearts of English Catholics. Philip had relied on a Catholic rising to assist in the accomplishment of his fell purpose, but in this he counted without his host To their credit be it said, Catholic gentry led their tenantry to the muster at Tilbury, and Catholic lords brought their vessels up alongside of Drake and Howard. One is struck by the smallness of our naval force in comparison to the vast fleet of the Spaniards. The English fleet numbered only eighty vessels. Fifty of them were little larger than yachts of the present day, and of the thirty Queen's ships which formed the main body there were only four which equalled in tonnage the smallest of the Spanish galleons. Our ships, though small, were in excellent trim, were manned by 9,000 hardy seamen, and were commanded by some of the bravest and most skilful captains that the world has ever produced. The Spanish fleet, in the form of a vast crescent, spread over seven miles of sea. When it was observed off the Lizard by Captain Fleming, Drake and some of the other English captains were playing bowls on Plymouth Hoe. This scene is cleverly depicted in Lucas's famous painting, "The Armada in Sight." But Drake was determined not to have his sport spoiled by the Spaniards. When the news reached the players he is reported to have said, "There is time to finish the game and beat the Spaniards afterwards." There must have been wonderful self-composure and confidence in the man to speak and act thus when the formidable fleet was full in view. No time was lost, however. The lightly-handled English ships, which sailed two feet to the Spaniards' one, and fired four shots to the Spaniards' one, were speedily in action. Galleon after galleon was sunk or driven on shore. To use the expression of English seamen, "The feathers of the Spaniard were plucked one by one." The Duke of Medina Sidonia could not bring his pursuers to a close engagement, although he endeavoured by various devices to do so. There was a running fight between the fleets, lasting throughout the week, till what was left of the Armada dropped anchor in Calais Roads. On the night of Sunday, July 28th, Lord Howard lighted six fire ships and sent them down with the tide upon the Spanish line. The Spaniards were seized with a sudden panic, and cut their cables. Two large ships caught fire; some ran ashore; the rest drifted with the wind in a long line. At dawn the next day the English closed fairly in, and more of the enemy's galleons were sunk. Four thousand Spaniards perished; the fleet was utterly disorganised; and as the return by the Channel was impossible, the Spanish captains resolved to go round by the Orkneys. The English, for want of supplies, were compelled to relinquish the chase; but the defeat of the Armada was rendered complete by a power mightier than the English fleet. The storms of the Northern seas wrecked and dispersed the Armada. The large number of corpses and wreckage that strewed the coasts of Ireland and Scotland bore testimony to the terrible havoc that had taken place. Of the whole fleet that had left Spain to sweep all before it in the English Channel, only fifty vessels returned. Such, briefly, is the story of the "Invincible Armada." The British victory was the most glorious that is recorded in naval annals.—*Nottingham Express.*

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A MISUNDERSTANDING.

The Wallachian peasants are said to resemble those of Ireland, especially in their hospitality to pigs, and in their simplicity. As illustrative of the latter quality, a traveller relates the following anecdote, though without vouching for its truth: Some peasants were one day working in a field near the banks of the Maros. Suddenly they saw a stranger rush frantically through the field, and plunge headlong into the river. They pursued, and dragged him out, dripping; he departed, and they resumed their work. Shortly afterwards he again appeared, and for the second time took a suicidal "header." Again the peasants snatched him from the raging torrent, and returned to their work. Yet a third time they saw him enter the field; but on this occasion he did not make for the river, but climbing into a tree, deliberately proceeded to hang himself from one of the branches. This time his former preservers did not interfere and he drained the cup of his fate to the last drop. Presently a crowd of the relatives and friends of the deceased, from whose custody he had escaped, arrived, headed by the parish priest, and roundly abused the peasants for permitting the late lamented to kill himself. The peasants naïvely replied that they had pulled him out of the river twice, and as he was dripping wet, they thought he had *hung himself up to dry.*

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THE POSITION OF A Q.C.

For a long time the King's or Queen's Counsel were really what their name implies—counsel retained by the Sovereign for the purposes of prosecution in high treason, or in other matters affecting his person or position. The status of a modern Queen's Counsel is only that of a barrister who has reached a certain grade in his profession. When a man becomes a Queen's Counsel his work is considerably altered, and so are his duties towards his clients. For a Queen's Counsel can only appear in court, and before an arbitrator or other semi-judicial person, and write opinions upon cases submitted to him for his advice. All the voluminous work known as pleading—that is, drawing up the initial proceedings in an action, such as statements of claim and of defence, framing written interrogatories in order to obtain information from the different parties to an action, he is now forbidden, by the etiquette of the profession, any longer to transact. His labour is purely that of an adviser, or else of an oratorical or argumentative description. But whilst his sphere of labour is thus curtailed, his fees are increased. For a "silk" as he is called, because a Queen's Counsel wears a silk instead of a stuff gown, always obtains a higher fee when he appears in court than does a junior; so that, even with a smaller amount of work, it is possible for a Queen's Counsel to obtain an income equal to that which he gained as a "junior" barrister.

But this degree is not conferred voluntarily and without asking the Lord Chancellor; for every barrister who desires it must apply to the Lord Chancellor for the time being, and support his claims by the aid of those who have legal or general influence. When the Lord Chancellor has made out a list, it is shown to the Sovereign for approval. The reasons which induce barristers to "take silk" are as various as the effects of it on their professional life. There are some men, well advanced in years, with no powers of speaking, for whom it is the crowning step of a careful and laborious professional life, and who, when it is conferred, practically retire from their profession. There are others comparatively young and still vigorous, with considerable powers of speech, and, perhaps, a large knowledge of law. For these "silk" means an increased income, a general advance in the opinion of the legal profession and of the public; so that they become leading advocates, perhaps shine in the political world, perhaps become law officers of the Crown, and perhaps reach the judicial bench. These are the men who really adorn the dignity of a Queen's Counsel. But there is yet an intermediate class. These are barristers with plenty of practice, or juniors with considerable legal knowledge, not yet grown old, but who are not likely to succeed as speakers, yet are essentially "safe" lawyers. These men by taking silk get a small leading business, write many opinions for which they get fair fees, and are put into a lawsuit as a second man, between the great leader and the regular junior, to do the quiet part of the court work; whilst the leading Queen's Counsel, a brilliant speaker, appears only to make an opening or a concluding speech. Thus these barristers with less labour attain a higher position in the profession, and an income as good as, or exceeding, that which they gained when arrayed in the stuff gown of the junior barrister, whilst they obtain as Queen's Counsel precedence over members of the junior bar when they have to make some motion before a court or judge.

HOW THE FRENCH AND ENGLISH TRAVEL AT NIGHT.

If you are travelling at night with French fellow-travellers, the difference between English and French people will show considerably.

The Frenchman will put on a soft silk cap, he will even tie a scarf over his head and under his chin in order to be secure from the draughts; he will take off his boots and produce an old pair of slippers from his bag, and he will dispose himself for sleep, carefully covering himself with rugs.

The Frenchwoman will be equally prudent. She will put on a loose long jacket, of pretty material and pretty make, you may be sure, and under this she can afford to loosen the tight dress bodice that fashion requires. She also will produce an elegant pair of slippers, matching the jacket, and will swathe her head and shoulders in a dainty woollen fichu, of the same colour as jacket and slippers.

In the early morning, when daylight is breaking over the silent land, and bursting in streaks into the carriage, the French travellers refresh themselves with an informal toilet. The lady pours some *eau de rose* or *eau de lavende* into a tin cup, and with the corner of a small towel, brought on purpose in the hand-bag, wipes her face diligently.

With her brush and comb she arranges her hair, and she adjusts her hat or bonnet, packs up her long jacket and slippers, etc., and is finally taut and trim when, at the next station, it is announced that *café au lait* is served at the *buffet*, and that the train will stop for twenty minutes.

We English more often tumble out of the railway carriage in a condition that would lead one to think we had passed the night in an Irish cabin. The English travellers disdain the precautions to which I have referred; they will declare that they cannot sleep in the train, therefore it would be useless to make any preparations.

Presently they begin to nod and sway about, and finally, being only fallible human beings, fall asleep, their hats being flattened against the back of the carriage, their clothes creased and tumbled, and their feet aching because of the unwonted confinement in stiff walking-boots. Thus they sleep in the utmost discomfort.

When the morning comes, then they are pitiable to look upon; and seen in the early sunlight, it will be hard to believe that the Frenchman is not more learned in the art of travelling than the Englishman. —*Tit Bits.*

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SELF-SUPPORT IN THE WATER.

The utmost care and judgment should be exercised by those who go bathing. It is perfectly foolhardy to take risks that may cost one's life. It is desirable at all times to be master of one's self, but never is presence of mind of more importance than when one is in the water. Many people are drowned because they exert themselves wildly when thrown into the water suddenly, forgetting completely in their fright the buoyancy of the water, which will sustain a body held by a slight support. Every person should learn to float who exposes himself to the danger of drowning. A recent writer says;

"It is, unfortunately, not generally known that a finger laid upon an oar, or the gunwale of an overturning boat, or a board, or almost any floating object, will sustain the human body in calm water. Persons who have been properly taught, and have acquired the habit of acting with self-possession in the water when they are upset, do not attempt to climb upon the overturned boat, but simply take hold of it and quietly support themselves. A boat half filled with water, or completely overturned, will support as many persons as can get their hands upon the gunwale, if they behave quietly. In case of accident, a person who understands and acts in accordance with these facts would stand a better chance of being saved, even if he were a poor swimmer, than an expert swimmer would have who should lose his presence of mind."—*Iron.*

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WOMEN'S DRESS IN TURKEY.

The out-door dress of Turkish women consists, first, of trousers made of very large-patterned, gaudy-coloured chintz, sometimes fastened at the ankle and sometimes at the knee. The feet are covered only by short woollen socks and slippers without heels, though of late years some women wear congress gaiters. Above the trousers they wear a skirt made of four breadths of bright-coloured material, frequently pink or green satin. These breadths are not sewn together, but hang each separately, about two yards in length. In the house these are left to trail upon the floor, and have the effect of a court train, only rather more graceful. In the street these are tucked up under the ceinture, or sash, not to touch the ground. This sash, so called, is no more nor less than a thick cashmere shawl folded crosswise and tied around the waist in heavy, ungraceful folds, some of them being immense and all ugly. For corsage they have first a gauze chemise with long full sleeves, and outside of this a short jacket which buttons at the waist-line with three small gilt or gold buttons. The sleeves are tight, reaching but to the elbow, and the gauze sleeves fall below them. The front is cut very low, so as to leave the bust entirely exposed, which is in turn partly covered by the gauze chemise. As many strings of beads, jewels, and necklaces as can be obtained are worn around the neck and hanging down over the bust. Sometimes there will be five or six strings of cheap beads and tinsel ornaments, and an almost priceless diamond necklace all on together. Bracelets, four and five inches wide, thickly studded with jewels, will be worn on the wrists, and as many rings as will hold on the fingers, worn outside the gloves. Earrings of immense size are always worn, some of them being valuable and others of the cheapest pinchbeck. These women do not value their jewels by price so much as by caprice.—*Brooklyn Magazine.*

THREAD AND NEEDLE TREE.

The luxury of a thread and needle tree! Who can estimate the comfort of such hopefulness at one's very door? Fancy the delight of matron and maiden dwelling under such overshadowing!

Odd as it may seem to us, there is upon Mexican plains just such a forest growth. Imagine a "sewing bee" gathered under such fair foliage! No need of spools for ever rolling hither and thither. Is there a seam ready for busy fingers, or an appealing rent? Just step outside the door of the much-favoured Mexican house mother, lay your hand upon a slender thorn-needle pushing itself persuasively from the tip of a rich, dark-green leaf, draw it carefully from its delicate sheath, slowly, slowly unwinding with your hand the thread, a strong, well-rounded fibre, already attached to the needle, and oh! so tenderly folded away by generous Mother Nature as to hold within itself possibilities of a long stretch of the cord.

Travellers are enthusiastic over the resources of the maguey-tree; and of its beauty no less, telling us of "clustering pyramids of flowers towering above dark coronals of leaves."

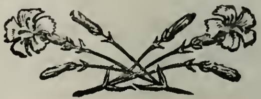
The roots, well prepared, are a most savory dish; with its leaves may be made a "thatching fit for a queen," and no prettier sight can be met than the cottages of Mexican peasants so exquisitely crowned. The rich leaves also afford material for paper, and from the juices is distilled a favourite beverage. From its heavier fibres the natives manufacture strong cords and coarse, strong cloth. No wonder the maguey-tree of tropical climates has attained world-wide fame!—*Harper's Bazaar.*

THE POWER OF SONG.

The following touching incident is recorded of Madame Marie Roze, during her sojourn in America, and while on a visit to Auburn prison, New York, where she sang in the presence of nearly all of its inmates, including upwards of twelve hundred convicts. On her arrival she desired to know if all the prisoners were present, and being answered in the negative she requested that even those in solitary confinement should, as a special privilege, be permitted to come into the chapel and join the other convicts in listening to the music she proposed to sing. The request was accorded, and the poor fellows, some of them for the first time for many years, were permitted not only to look once more on the face of a beautiful woman, but to hear again from an accomplished artiste the sweet notes that reminded them of the innocent days of youth. The chief selections of Madame Roze were "Sweet Spirit Hear My Prayer," and "The Sweet By and By," and even the most hardened criminals were stirred to tears. After this the fair cantatrice made a tour of the institution, the prisoners meanwhile being retained in the chapel, and on her return she sang the old familiar air, "Comin' thro' the Rye." The most intelligent of the convicts prepared a testimonial of thanks, which was duly signed and presented to the lady. It closed with the following quotation:—

God sent His singers upon earth
With songs of sadness and of mirth,
That they might touch the hearts of men
And bring them back to heaven again.

—*Montreal Weekly Witness.*



Humorous.

I AM MY OWN GRAND-FATHER.

I have got mixed up till I don't know who I am. I married a widow who had a grown-up daughter, and my wife's daughter she became my step-daughter. A little while after I got married I sent an invitation to my father, and he came down and paid me a visit. Well, the old gentleman being in the same house saw my wife's daughter (that is my step-daughter), and fell in love with my step-daughter and married her. And that is where the trouble first commences, for you see since my father married my step-daughter, of course the family began to get mixed up, for then my wife became mother-in-law to her own father, and my father is my step-son, and my step-daughter is my mother-in-law. Well, a little while after, my wife had a little boy. Now that boy being my son, of course was my father's grandson, but because my father married my step-daughter, who was this boy's half-sister, he became his half-brother. So my son is grandson to his half-brother, my father is grand-father to his brother-in-law, and my step-daughter is grandmother to her own brother. A little while after my father's wife had a little girl. Well, the girl being my father's daughter of course was my sister, but because she was the daughter of my step-daughter of course she became my step-grand daughter, so I am grandfather to my own sister, and my wife is grandmother to her own sister-in-law. So at last the case stands thus—I am grandfather to my own sister, my wife is grandmother to her sister-in-law, my son is grandson of his half-brother, my father is grandfather of his brother-in-law, my step-daughter is grandmother to her own brother, my wife is mother-in-law to her own father-in-law, my father is my step-son, my step-daughter is my mother-in-law, I am grandfather to my own sister, and I am blessed if I ain't my own grandfather.

WHAT WOULD STOP THEM.

A particularly vigorous speaker at a woman's rights meeting waving her long arms like the sails of a windmill, asked, "If the women of this country were to rise up in their thousands and march to the polls, I should like to know what there is on this earth that could stop them!" And in the momentary silence which followed this peroration a still small voice remarked: "A mouse!"

A JUDGE ENFORCING ORDER.

It was in Sabine County, Texas, a few years before the late war. Judge R—— was holding court on the second floor of a building. On the first floor a gambling bank was in full blast, and the players annoyed the court very much by their wrangling. After several ineffectual attempts by the officer of the court to enforce order, the judge left his bench, entered the gambling room, and took a hand in the game. An hour later he re-entered the court room, and, throwing a small sack of money on his desk, placidly remarked: "This court has got to have order, and I'm going to have it even if I have to bust the bank again every day." The court had strict order during the remainder of the session.

FIRST ATTEMPT AT ECONOMY.

A man being told by his wife that there were several pieces of tin which needed mending, conceived the idea of getting an iron and solder, and doing the mending himself. His wife, filled with vague forebodings, perhaps, said that the expense was such a trifle that it would hardly pay to do it oneself, to which he responded: "I'll admit that in this one instance it would not pay; but there is something being in want of repair every little while, and if I had the tools here for fixing it, we are saved so much expense right along.

It may not be much in the course of a year, but every little helps, and in time the total would amount to a nice little lump. We don't want the Rothschilds carrying off all the money in the country.

He got the iron for 2s. 6d., and 1s. worth of solder, and 6d. worth of resin. He came home with these things, and went into the kitchen, looking so proud and happy, that his wife would have been glad he had got them were it not for an overpowering dread of an impending trouble. He called for the articles needing repair, and his wife brought out a pan.

"Where's the rest? bring 'em all out, and let me make one job of 'em while I'm about it."

He got them all, and seemed to be disappointed that there were not more of them. He pushed the iron into the fire, got a milk pan inverted on his knee, and, with the solder in his hand, waited for the right heat.

"That iron only cost 2s. 6d., and it'll never wear out, and there's enough solder in this piece to do two pound's worth of mending," he explained to his wife.

Pretty soon the iron was at the right heat, he judged. He rubbed the resin about the hole which was to be repaired, held the stick of solder over it, and carefully applied the iron. It was an intensely interesting moment. His wife watched him with feverish interest. He said, speaking laboriously, as he applied the iron, "The only thing I regret about it is, that I didn't think of getting this before we——"

Then ascended through the ceiling and up into the sunlit sky, the awfullest yell that woman ever heard, and the same instant the soldering iron flew over the table, the pan went clattering across the floor, and the bar of solder struck the wall with such force as to smash right through both the plaster and lath; and before her horrified gaze danced her husband in an ecstasy of agony. Sobbing, screaming, and holding on to his left leg as desperately as if it was made of solid gold and studded with diamonds:

"Get the camphor, why don't you," he yelled. "Send for a doctor; oh! oh! I'm a dead man," he shouted.

Just then his gaze rested on the soldering iron. In an instant he caught it up and hurled it through the window, without the preliminary of drawing the sash. It was some time before the thoroughly frightened and confused woman learned that some of the molten solder had run through the hole of the pan and on to his leg, although she knew from the first that something of an unusual nature had occurred. She didn't send for the doctor; she made and applied the poultice herself—to save sixpence, she said.

"We don't want the Rothschilds carrying off all the money in the country, you know."

* * *

SYMPATHETIC TRAVELLERS.

There was a family in the train between Birmingham and Anniston, who had come out of the woods of Mississippi and were on their way to some place in Georgia. It was their first ride in the cars, but while the wife and children were full of natural curiosity, the husband didn't propose to give his ignorance away. When the wife asked him what kept the coaches on the track, he looked at her with pity in his eyes and answered: "Maria, don't you know nothin' 't all? They put tar on 'em to make 'em stick!"

She was not satisfied until we switched in on a side track to let a passenger train go by, and then she asked: "Gordon, what do they do this for?"

"'Nother train going by, Maria."

"And do we have to get off the track?"

"Yes; it's the new way. They used to have one train scramble over the other, but it scared the passengers so that they have adopted another plan."

She looked up at the ceiling and then out on the extra track, and replied: "You orter buy some nuts of the boy, Gordon, and show the railroad that we appreciate this extra expense they have gone to. They must have feelings as well as us"—*Detroit Free Press.*

Poetry.

DEATH OF AN ENGINEER.

When the golden gleams of sunlight
  Slowly faded from the west,
And the soft and silvery moonlight
  Calmly crept across the crest—
When the dew was on the heather,
  And the autumn leaves were sear,
Hastening to home and mother,
  Dashed the daring engineer.

See the headlight shake and shiver
  As she wrestles with the rail ;
Every sinew seems to quiver,
  As she trembles o'er the trail ;
Two brave hearts are proudly beating,
  Keeping time with the machine
That through the moonlight swiftly fleeting,
  Bears her burden on to Keene.

Where the misty mountain ranges
  Lift aloft their polished peaks ;
Every curve her course now changes ;
  While the whistle wildly shrieks,
And the bell that's in the bracket
  Rung with every rock and reel—
Echoes through the crags and canons
  With a wild and weird peal.

Now the agent at the station
  Looks with awe and holds his breath,
While a proud heart's quick pulsation
  Makes its meeting point with death ;
See the fire fly from her flanges ;
  Straining every iron nerve,
And a moment more she plunges—
  Madly leaps across the curve.

Now the fireman, bruised and bleeding
  Climbs the rough and rugged hill ;
Through the steam to where is mate
  Lies pinioned 'neath the engine still ;
"Finn," he whispered, "tell my mother—
  Go and tell her how I died ;
Tell her, could I lived to see her,
  All my hopes were satisfied.

"How the cruel monster scalds me ;
  Oh, my time is coming now ;
I must go, my Master calls me :
  See the death dew on my brow."
Soon strong arms with picks and shovels
  Moved the wreck and ruins back ;
Soon they rescued him and bore him
  To a seat beside the track.

The pale, still moon seemed more than tender,
  As it kissed his face so fair,
And the gentle autumn zephyrs
  Faintly fanned his auburn hair ;
Then he put his two great hands in mine,
  And a tear was in his eye,
As I stooped to hear him whisper—
  "Can't you take me home to die."

As we laid him on the cushion
  In the car that bore him home
We could hear the dying requiem
  Of the steam from out the dome.
But another hour found him
  In a mother's tender care ;
At his home with friends around him.
  God had heard his simple prayer.

Then we stood and stared in silence,
  Counting every fleeting breath,
And upon his marble forehead
  Came again the dew of death ;
Oh, how peaceful, pale, and patient,
  While in agony he lay ;
Then he smiled and kissed his mother,
  And his spirit went away.

C. H. Warman.

HOPE.

I cannot think, as some have taught,
  The soul deluded in its trust,
That life with all its interests fraught
  Is but a slave to time and dust.
    No ! there must be,
    It seems to me,
A grander highway yet untrod ;
    Some nobler goal
    In which the soul
Will rise triumphant o'er the clod.

Is all the human soul holds dear,
  Of mouldering ashes born and bred ?
Will naught of love survive the bier ?
  No flower blossom from the dead ?
    Must shroud and tomb,
    And cypress gloom,
Our life and hopes e'er long divide ?
    Must this warm heart
    Become a part
Of all that sleeps 'neath Lethe's tide ?

No ! Nature's answer greets mine ear ;
  I feel her great heart throb and beat ;
The whisperings of her voice I hear,
  She speaks in accents sure and sweet.
    Hope, hope, dear heart,
    Thou art a part
Of all that fills immensity.
    No clime so far,
    No distant star,
But kindred chords do bind to thee

To faltering Hope her greetings come
  Like music's soft and soothing strain,
And high above the great world's hum,
  Despair may catch this sweet refrain :
    "O'er pall and bier,
    O'er grief and fear,
O'er crumbling dust and mortal gloom ;
    The great soul stands,
    And e'er commands,
That Life shall blossom from the tomb."

OLD SAYINGS.

As poor as a church mouse,
As thin as a rail;
As fat as a porpoise,
As rough as a gale;
As brave as a lion.
As spry as a cat;
As bright as a sixpence,
As weak as a rat.

As proud as a peacock,
As sly as a fox;
As mad as a March hare,
As strong as an ox;
As fair as a lily,
As empty as air;
As rich as Crœsus,
As cross as a bear.

As pure as an angel,
As neat as a pin;
As smart as a steel-trap,
As ugly as sin;
As dead as a door-nail,
As white as a sheet;
As flat as a pancake,
As red as a beet.

As round as an apple,
As black as your hat;
As brown as a berry,
As blind as a bat;
As mean as a miser,
As full as a tick;
As plump as a partridge,
As sharp as a stick.

As clean as a penny,
As dark as a pall;
As hard as a millstone,
As bitter as gall;
As fine as a fiddle,
As clear as a bell;
As dry as a herring.
As deep as a well.

As light as a feather,
As firm as a rock;
As stiff as a poker,
As calm as a clock;
As green as a gosling,
As brisk as a bee;
And now let me stop,
Lest you weary of me.

THE BLIND BOY.

O say what is that thing call'd Light,
Which I must ne'er enjoy;
What are the blessings of the sight,
O tell your poor blind boy?

You talk of wondrous things you see,
You say the sun shines bright;
I feel him warm, but how can he
Or make it day or night?

My day or night myself I make
Whene'er I sleep or play:
And could I ever keep awake
With me 'twere always day.

With heavy sighs I often hear
You mourn my hapless woe;
But sure with patience I can bear
A loss I ne'er can know.

Then let not what I cannot have
My cheer of mind destroy:
Whilst thus I sing, I am a king,
Although a poor blind boy.

Cibber.

ADVERSITY.

Daughter of Jove, relentless power,
Thou tamer of the human breast,
Whose iron scourge, and torturing hour,
The bad affright, afflict the best!
Bound in thy adamantine chain,
The proud are taught to taste of pain,
And purple tyrants vainly groan
With pangs unfelt before, unpitied, and alone.

. . . . . .

Oh, gently on thy suppliant's head,
Dread goddess. lay thy chastening hand!
Not in thy Gorgon terrors clad,
Nor circled with the vengeful band,
As by the impious thou art seen,
With thundering voice, and threatening mien,
With screaming horror's funeral cry,
Despair, and fell disease, and ghastly poverty.

Thy form benign, O goddess, wear,
Thy milder influence impart,
Thy philosophic train be there,
To soften, not to wound, my heart!
The generous spark extinct revive,
Teach me to love and to forgive,
Exact my own defects to scan,
What others are, to feel, and know myself a man.

Gray.

NOBILITY.

By Alice Cary.

True worth is in being, not seeming—
In doing each day that goes by
Some little good—not in the dreaming
Of great things to do by and by.
For whatever men say in blindness,
And spite of the fancies of youth,
There's nothing so kingly as kindness,
And nothing so royal as truth.

We get back our mete as we measure—
We cannot do wrong and feel right,
Nor can we give pain and feel pleasure,
For justice avenges each slight.
The air for the wing of the sparrow,
The bush for the robin and wren,
But always the path that is narrow
And straight for the children of men.

'Tis not in the pages of story
The heart of its ills to beguile,
Though he who makes courtship to glory
Gives all that he hath for her smile.
For when from her heights he has won her,
Alas ! it is only to prove,
That nothing's so sacred as honour,
And nothing so loyal as love !

We cannot make bargains for blisses,
Nor catch them, like fishes, in nets ;
And sometimes the thing our life misses
Helps more than the thing which it gets.
For good lieth not in pursuing,
Nor gaining of great nor of small,
But just in the doing, and doing
As we would be done by, is all.

Through envy, through malice, through hating,
Against the world, early and late,
No jot of our courage abating—
Our part is to work and to wait,
And slight is the sting of his trouble
Whose winnings are less than his worth
For he who is honest is noble,
Whatever his fortunes or birth.

◆

LEND A HELPING HAND, MY BROTHER.

Lend a helping hand, brother ;
Sister, cheer the saddened one,
Earth is full of Sorrow's children,
God has plenty to be done.
He has placed thee here for something,
Some great purpose to be wrought ;
See thou dost not lose thy crowning
When rewards cannot be bought.

Kind acts hurt thee very little,
Kind words cost thee even less,
Cups of water gladly given
God will surely mark and bless.
Earth is strewn with rough, dark places,
Pitfalls for the young and wild ;
Strive to rescue them from danger,
Guide them as a wayward child.

Treading daily life's stern pathway,
Some discouraged ones we meet,
Seeking work to keep off famine,
Up and down the crowded street.
Do not spurn these weary plodders,
Turn not from them in disdain ;
Lend a helping hand, good brother,
And their thanks most gladly claim.

Correspondence.

NOTICE TO CORRESPONDENTS.

We do not hold ourselves responsible for the opinions expressed by Correspondents.

We reserve to ourselves the right to publish or reject any correspondence

Rejected correspondence will not be returned unless accompanied by a stamped envelope.

All correspondence to be written on one side of the paper only.

We shall be glad to receive articles of interest and information on Railway Work, Machinery, &c. (English or Foreign), interesting Stories of Railway experiences, information of accidents, or any subject of general interest.

All correspondence to be addressed to Mr. T. G. Sunter, General Secretary, 17, Mill Hill Chambers, Leeds.

CONTINUOUS BRAKES.

To the Editor of the Associated Society of Locomotive Engineers and Firemen's Journal.

Sir,—In your last issue, page 169, reference was made to the important subject of the management of continuous brakes, and the quotation from the *Engineer* proves conclusively that brakes, like every other railway or mechanical appliance, must be properly worked and efficiently maintained. The article in question has directed special attention to the working of the well-known Westinghouse triple valves. It is certainly a very strange fact that triple valves can be, and actually are, in daily use upon various railways in this country and in all parts of the world with the most perfect success, yet that they are said not to work well on the Midland Railway. There is, however, a still more strange fact which does not seem to be mentioned in the article, namely, that when these same Midland triple valves are used upon other lines they do not give trouble. The Westinghouse brake on the Midland was only used upon the through Scotch express trains running between St. Pancras, Carlisle, Glasgow and Edinburgh, the daily run of those trains being therefore, in round numbers, about 400 miles—300 miles upon the Midland Railway, and about 100 miles upon either the Glasgow and South Western, or North British Railways. Now it will be seen that one-fourth part of the daily mileage recorded was run north of Carlisle; it is consequently natural to expect that the same triple valves which give, or were reported as giving, so much trouble upon the Midland, would give an equal amount of trouble upon the two Scotch railways over which the through trains ran, but, upon turning to the Board of Trade returns of failures recorded by the Glasgow and South Western and North British companies, we shall find that not one single triple valve upon these through Midland trains gave any trouble whatever during the half year. It is, therefore, to say the least, somewhat mysterious that the same triple valves which work perfectly north of Carlisle are said not to work well south of that town. As pointed out in the *Engineer*, many cases have occurred in which triple valves have been reported as in fault, but an examination has proved that other circumstances or mismanagement have been the true cause. It should also be mentioned that the Midland rolling stock for Scotch traffic is fitted with two complete brake systems, and it frequently happens that part of a journey is worked with one brake and another part with the other, and, at stations where the change has been made delays have sometimes occurred in starting. I have seen many such cases in which it has not been at all clear as to which brake it was that actually was holding the brake-blocks on the wheels, however, upon reference afterwards to the Board of Trade returns, I have noticed that the unfortunate triple valve has had to take the blame.

Many of the so-called faults of triple valves may be explained by the remark that "all the rest of the brake can be seen, so *if no fault can be seen* the triple valve, rightly or wrongly, must be considered in fault."

It is satisfactory to find, that, especially since the Hexthorpe disaster, the Companies are adopting automatic continuous brakes, and we must hope that they will maintain such brakes in good working order.

I am, Sir, yours truly,
CLEMENT E. STRETTON.
Consulting Engineer, Associated Society of Enginemen and Firemen.
Leicester, 28th July.

◆

RAILWAY SPEED.

SIR,—The acceleration of the London and North Western Scotch express traffic mentioned in your Journal for July, has been followed by considerable increase of speed, both upon the Great Northern and Midland routes.

During the past few years your readers are aware that the speeds between London and Liverpool, Manchester, Leeds, and Bradford, have been gradually but very considerably increased; on the other hand, however, the speeds of Scotch trains have remained practically unaltered, therefore it will be seen that to a great extent the increase that has now been made is attained by booking the Scotch express traffic at a pace equal to that of the Manchester or Leeds expresses, and even now, after the present accelerations, a Manchester express, the Great Northern 4.18 p.m., from Grantham to King's Cross, still retains its position as the fastest train in the kingdom, or in the world, as it runs at an average of 54 miles an hour.

Adverting to long runs without stopping, mention should be made of the splendid run by the Midland Company's Edinburgh express between St. Pancras and Nottingham, the distance being 123 miles 61 chains.

It is reported that further important accelerations are to be shortly introduced, in which case doubtless the total number of "stops" will be reduced. When trains of passengers are ready to start from London for Scotland by all the three routes, it is useless to occupy time stopping at a number of stations. Enginemen and firemen know well the loss of time which occurs in stopping at a station, and in attaining speed. It is also a well-known fact that if high average speed and punctuality are to be maintained it must be by long runs between stations, for, when a train arrives at its destination "late," it will almost invariably be found that time has been lost at stations, and not by the engine in running. Hence the theory is somewhat generally accepted that the chances of punctuality decrease in a proportion dependent upon the number of stops, or, in other words, the fewer stations an express train is booked to stop at, the more certain it is to arrive punctually at its destination.

Several of the daily papers, commenting upon the recent accelerations, have fallen into serious errors with regard to the "distances," I therefore trust the following tables will place the facts clearly before your readers :—

LONDON TO EDINBURGH.

Miles.	Route.	Train	Time on Journey.
392½	East Coast ..	10.0 a.m.	8 hours 30 mins.
400¼	West Coast ..	10 0 a m	9 hours.
*412¾	Midland	10 40 a m.	hour 50 mins.

* The Midland train runs *via* Nottingham and Leeds, thus increasing the distance by 6 miles 68 chains.

The Midland shortest route, *via* Leicester and Staveley, is 406 miles.

LONDON TO GLASGOW.

Miles	Route.	Train.	Time on Journey.
401½	West Coast ..	10 0 a m.	9 hours.
423	Midland	10 30 a.m.	9 hours 20 mins.
439¾	East Coast ..	10.0 a.m	9 hours 50 mins.

LONDON TO MANCHESTER.

Miles.	Route.	Fastest Train,
183½	L & N. W.	4 hours minutes.
*190¼	Midland	
203	Great Northern ..	

* The Midland 2.0 p.m. express from St. Pancras runs *via* Nottingham to Manchester, a distance of 197¼ miles, in 4 hours 20 minutes.

Some railway shareholders, it appears, have viewed with alarm the recent acceleration of speed of express trains between England and Scotland, and wonder if it will pay. It is perfectly correct that the increased accommodation will increase the working expenses ; but those who have watched the working of railways are well aware that improved facilities always lead to development of traffic, and, as a matter of fact, the improvement in the train service has considerably increased the total number of passengers, notwithstanding the recent unfavourable weather. At the present time trains by either route wait at Preston, Normanton, Leeds or York, for passengers to dine. The introduction of first and third class dining cars or carriages would be a great convenience to passengers, and would save considerable time.

Yours truly,

Clement E. Stretton.

RAILWAY SPEED.

Sir,—In my letter sent to you last week I mentioned a report that further acceleration of speed of Scotch express trains would probably take place on the first of August.

On Saturday, 28th July, the London and North Western and Caledonian Companies announced that they would reduce the time between Euston and Edinburgh to eight and a half hours, and yesterday the Great Northern and North Eastern Companies replied by deciding to reduce the time between King's Cross and Edinburgh to eight hours. It is generally understood that when the Scotch competition is ended the three lines will turn their attention to Manchester and London traffic with a view to performing that journey in less than 4¼ hours.

Yours truly,

Clement E. Stretton.

THE PROPOSED ORPHAN FUND.

Sir,—As you have asked for suggestions for the formation of an Orphan Fund, and, as I am one of the number who are very anxious to see one formed, allow me to make a few propositions concerning it. In the first place it will be the means of drawing members to our Society, which should be taken into consideration ; and I consider it should be optional, as we cannot *make* men join an orphan fund that have no children, and who would join out of kindness to assist their fellow workmen's children were it optional.

I propose that we pay one shilling entrance fee, and one penny per week contributions, which would amount to more than if enginemen paid five and firemen three shillings per year, and I think would give general satisfaction to both, and that we pay a quarter's contributions before any money is paid out. The question of the amount to be paid to each child, I leave open, as that could not be dealt with until it was seen how many men joined, our income, &c.

I beg to remain,
MEMBER OF PADDINGTON BRANCH.
London, July 2nd, 1888.

* * *

REPLIES TO QUERIES.

SIR,—I find there is a difference of opinion in respect to the statement by Mr. Michael Reynolds, that if he broke a foregear eccentric rod near to a turntable he would turn his engine and take the train complete to destination in backgear, and I am of opinion that it can be done with ease in the following manner: Secure the foregear rod which is broken to the backgear rod—this performance could be done in five minutes. The engine would then require working with the lever in full backward gear or forward gear as the case might be, and the engine would be equally powerful and true as before.

Yours,
G.W.R. GOODS FIREMAN.

SIR,—In reply to query No. 5 in your June issue, in reference to broken eccentric rod, allow me to inform "Engineman" that it is not necessary to substitute the broken forward gear rod to operate the valve in back gear. The slide valve has the action only of the eccentric rod that is in line with it, the forward gear rod for forward motion, and the backgear rod for backward motion, and not a combined action of back and foregear rods to operate the valve in any one direction. The broken rod and strap should be taken down to prevent further damage, the engine turned, and the valve thus operated by the backgear eccentric. This is only necessary when the train is too heavy to be drawn with one cylinder. If it is a very light train the broken rod and strap should be taken down, the valve spindle disconnected, and the valve placed in the centre of the valve seat to shut off the steam from the cylinder on that side of the engine, and fastened there by screwing up the spindle gland nuts tightly either top or bottom, and the engine worked with one cylinder only. When this is done great care should be exercised not to stop the engine on the dead point, or it will be necessary to move her with crowbars or some other means a little distance, sufficient to open the port to admit steam.

I am, yours,
CATHAYS.

Reply to Query No. 5, June issue:—

The action of one eccentric is directly opposite to the other, and they move in contrary directions to open the ports as required, as while one is in gear the other is simply doing nothing, but by being linked together at the ends of the rods the link is moved up or down at pleasure, and brings the fore or backgear rod in a line with the valve spindle. When the link is down the top rod becomes the driver, and when raised the bottom one, while the top rod simply moves to and fro with the link, which oscillates on the pin and block on the centre line of the valve rod, motion being thus imparted to the valve by the forward or backward eccentric as the case may be. I therefore agree with Mr. Reynolds that an engine might be worked as he states.

Yours truly, J. C.,
Stourbridge.

Answers to last month's Queries came too late for insertion in this issue. They will, therefore, have to stand over until our next.

* * *

QUERIES.

No. 1. Sir,—I have heard there are three classes of compound locomotives, the first having two cylinders, the second three, and the third four, and I shall esteem it a favour if any of your readers will state the difference in the motions of the above engines, also the positions of their cylinders and valves.

Yours truly, D. D.

No. 2. Sir,—If the muscles, nerves, &c., of the human body waste away like a burning candle, why is not the body consumed in a short interval?

No. 3. Does it ever happen that the venous blood is returned into the left side of the heart?

Answers will oblige, yours, J. W.

No. 4. Mr. M. Reynolds says, on page 112 of his "Enginemen's Pocket Companion," that, when a driving spring breaks or its hanger, if the spring is supported below the axle, a piece of wood should be placed between the horn block stay and the keep of the bearing, and if the spring is above the axle, the block of wood should be placed above the axle and between the top of the bearing and the frame. Is that correct?

Yours, D. D.

No. 5. Will some of your readers describe the Link Motion, and the position of the eccentrics in relation to their respective cranks?

W. S.

No. 6. Also to give an explanation of Lap and Lead, and to point out their advantages.

Yours truly, W. S.,
King's Cross.

Society News.

RE HEXTHORPE.

Our attention has been called to several newspapers which contain an account of a meeting held in Liverpool on Sunday, July 8th, under the auspices of the Amalgamated Society of Railway Servants, in which Mr. Fred Evans is reported to have said, that the defence of Taylor, the driver in the Hexthorpe disaster, cost their Society £593. Now as that sum represents the whole of the charges for the defence of Taylor, half of which was paid by us, we are at a loss to understand how to reconcile the statement made at the Liverpool meeting with the A. S. R. S. report for 1887, for on page five of that report it appears under the heading of legal cases that one half the costs of the trial of Taylor, the driver in the Hexthorpe disaster, was borne by another Society, our share being £295 2s. 1d., and if this mode of warfare is to be continued, all well and good, as we have only to produce the proofs of our assertions of the part played by us in connection with that trial (which we invariably do at every meeting we attend), to enable us to come off more than conquerors.

* * *

King's Cross Branch,
July, 1888.

The half-yearly meeting was held on Sunday, July 1st. There was a good attendance of members, in fact one of the best attended meetings we have had for some time, nearly 100 members paying their contributions; the other members, who were not present owing to being on duty, have since paid up. The most pleasing feature is that we are not losing any members, on the contrary, we enrolled two new ones, and many more have promised for our next meeting night.

I remain, yours,
F. Green, Secretary.

WORCESTER BRANCH,
July 2nd, 1888.

SIR,—I feel I am in duty bound to send you a few lines, although my report may not be a glowing one, but we must still keep hoping on. There are many at this station who are almost persuaded, and, indeed, I think time will tell wonders. Little by little we keep making progress. We had a very fair meeting last night, and we made one new member. We shall hold our next meeting in three weeks time, when I am full of hope we shall add more to our ranks. I am glad Mr. T. Ball did so well at Stourbridge. I have heard it whispered, and it is an open secret, that the Stourbridge men are as one man, and it shall not be said of us, at least I hope, that we are not the same.

I am, yours truly,
J. TROWBRIDGE, Branch Sec.

STRATFORD BRANCH,
July 2nd, 1888.

SIR,—We made five new members last meeting night, and several more proposed for the next meeting.

I remain, yours truly,
W. STEWART.

SHEFFIELD BRANCH,
July 16th, 1888.

SIR,—A fairly attended meeting took place on Sunday, July 15th, when a discussion took place on the proposed Orphan Fund. I am also pleased to say that we made two new members.

Yours truly,
T. BRIERLEY.

MANCHESTER BRANCH,
July 16th, 1888.

SIR,—I am forwarding you the names of four new members and hope to send a few more shortly. I am pleased to see that new branches are being regularly made, at the rate of one per month, this year. I hope this will continue.

I am, yours fraternally,
J. H.

NEATH, SOUTH WALES,
July 17th, 1888.

SIR,—I have pleasure in recording the names of seven additional members, and trust we may continue to make progress.

I am, yours fraternally,
T. EDMONDS.

PLYMOUTH BRANCH,
July 19th, 1888.

SIR,—I am pleased to say we continue to make progress, and that two new members have joined our ranks.

I remain, yours fraternally,
J. N.

STOURBRIDGE BRANCH,
July 23rd, 1888.

SIR,—We held the first monthly meeting of this branch on July 22nd, when I am pleased to inform you one new member was admitted.

Yours fraternally,
J. C., Sec.

CARDIFF BRANCH,
July 27th, 1888.

SIR,—Kindly insert in your next issue that our branch meetings are held at the Great-Western Coffee Tavern, the last Sunday in each month, at 3 p.m. I am also pleased to say that we admitted two new members at our last meeting.

I am, yours fraternally,
J. H.

BIRKENHEAD BRANCH,
July 21st, 1888.

We are doing very well in our branch just now, having made seven new members during the present month, which we consider is very conclusive that the men in our district are recognising the advantages of such an organisation to enginemen and firemen.

I am, yours fraternally,
F. C., Branch Sec.

Swansea Branch,
July 24th, 1888.

Sir,—An open meeting of the above branch was held on Sunday, July 1st, when Mr. Ball, the Organising Secretary, was present for the purpose of addressing the meeting, but unfortunately, as he was in the act of so doing; he was seized with a sudden illness, which necessitated his leaving the room and placing himself under medical treatment, and the branch fearing he would be unable to fulfil his several engagements in consequence of his illness (which the doctor certified to have been an attack of vertigo, and recommending a few days rest), they placed themselves in communication with the General Secretary, asking him to come down and carry out Mr. Ball's engagements, which Mr. Sunter readily complied with, but thanks to medical treatment and rest, he was sufficiently recovered by July 8th to accompany Mr. Sunter to Tondu, where I learn a splendid branch was opened on the afternoon of that date. They both returned to Swansea in the evening, and attended a good meeting in the branch lodge-room, at which the branch chairman presided, after whose opening remarks Messrs. Sunter and Ball addressed the meeting, and in the course of vigorous speeches pointed out the many benefits accruing from Trades Unionism, with the result that three new members joined the branch, and others promised to do so in the near future. There was some opposition from several persons present, which the speakers ably and successfully coped with, an ex-member of our branch then contended that he had a right to the grant allowed by the Society to duly elected representatives discharged from their situations, but however great his imaginary power might have been, he did not prove equal to the occasion, as Mr. Sunter soon showed the invalidity of his claim, after which he said he would do the Society all the harm he could. I simply mention this case as an illustration of the ingratitude of the man, who in addition to obtaining all the benefits allowed by the rules of the Society, had received considerable pecuniary support from the members of our branch. But as a Society we shall live and thrive better without him: we want busy bees, not drones. Much sympathy was expressed by the members with Mr. Ball, whom they hoped would soon regain health and strength and be as successful in the future as in the past. Hoping I have not trespassed too far upon your space,

I remain, yours fraternally,
J. Lloyd.

OPENING OF A NEW BRANCH AT TONDU, G. W. R.

On Sunday, July 8th, a branch of the Society was opened at Tondu, South Wales, the meeting being held at the Llynvi Arms, at 2.30 p.m., at which over fifty enginemen and firemen were present, including several members from adjacent branches. Mr. Sunter, general secretary, with Mr. Ball, organising secretary, attended. An engineman presided, and after his opening remarks called upon Mr. Ball, who gave a most encouraging address upon the objects and usefulness of the Society. Mr. Sunter followed, dealing very forcibly with the various points in his address, which was listened to with rapt attention by everyone present, his remarks being frequently applauded, owing to the many points in his address being so practically illustrated. Mr. Sunter closed his address by removing from the minds of several present the misconstructions, *re* the Hexthorpe disaster, clearly proving to all present the leading interest taken by this Society, and informed us that our numbers have already increased by over 300 this year. An earnest member of the Society gave a most encouraging address, explaining from his experience the benefits resulting from so many enginemen and firemen at some stations being members of this organisation. He exhorted those non-members present to fall in the ranks, and to do all they could to maintain the status of our profession, and maintained that had we possessed this Society some years ago we should not have been compelled to sacrifice anything. Let us profit by the past, let every man be true to his manhood, and assist his fellows to gain what is just and right. This spirit should imbue all men to maintain their position. At the close of the meeting every non-member present gave in their names to become members of the Society, and a branch of forty-eight members was successfully opened, including several transfers from other branches. Votes of thanks to the speakers and chairman having been given and suitably responded to, a most splendid meeting was brought to a close.

I remain, yours fraternally,
T. C.

Battersea Branch,
July 19th, 1888.

Mr. Editor,

Sir,—On Sunday, July 1st, a general meeting of enginemen and firemen was held at the Two Brothers Inn, under the auspicies of the A. S. L. E. & F., when Mr. C. E. Stretton, consulting engineer, and Mr. T. G. Sunter, general secretary of the Society, attended and addressed the meeting. The chairman of the branch presided, and after a few remarks asked Mr. Stretton to address the meeting. That gentleman then gave a very interesting address, he also alluded to his position as consulting engineer to the Society, and expressed his pleasure at belonging to such an organisation, as in his opinion the travelling public were greatly indebted to enginemen and firemen for their safety. He also hoped to have the pleasure of again visiting this branch in the near future. After speaking for about thirty minutes he resumed his seat amidst applause. Mr. Sunter then gave a stirring address on the objects and benefits of the Society, and spoke of the progress the Society was making, which he felt sure was an augury that enginemen and firemen were beginning to realise the necessity of being connected with an organisation composed of their class, and in response to his appeal to the non-members present to join our ranks, a number of enginemen and firemen gave in their names, one of them expressing an opinion that he felt sure from what he had heard that night that this Society was the one for enginemen and firemen. A vote of thanks was then given to the speakers, and the meeting was brought to a close.

I am, yours faithfully,
Branch Chairman.

Openshaw Branch,
Manchester, July, 1888.

Dear Sir,

A mass meeting of enginemen and firemen was held on July 29th, in the Co-operative Hall, Openshaw, at 2-30 p.m., when Clement E. Stretton, Esq., C.E., the Society's consulting engineer, occupied the chair, and opened the meeting with a very interesting and instructive address. Mr. T. Ball, the Society's organising secretary, also addressed the meeting in a very praiseworthy manner on the objects and general advantages the Society offers to enginemen and firemen in becoming members; we were also pleased with Mr. Ball's reference to and satisfactory refutation of the grossly misleading statements made by the A .S. R. S. in reference to the part taken by them in the case of Taylor and Davis, the driver and fireman in the Hexthorpe accident, and feel sure that the publication by them of such base statements have done them much more harm than good, as the confidence of its membership here is getting shaken, as some of its greatest champions gave in their names at the close of the meeting to become members of our Society. I am pleased to say the meeting was well attended, several having travelled over twenty miles to be present. At the close of the addresses the following resolutions were proposed, seconded, and carried unanimously:

1. Resolved—That the mass meeting having heard the objects and benefits of the Society, pledges itself to support the same, and calls on those non members present to join its ranks for their mutual benefit.

2. Resolved—That this meeting of enginemen and firemen is strongly in favour of a proper communication being provided upon *every* passenger train, irrespective of distance run, and urges the Companies and the Board of Trade to abolish the present twenty-mile regulation.

3. Resolved—That all Railway Companies be urged to adopt automatic continuous brakes without further delay.

4. Resolved—That long hours of duty are a great cause of accidents, and that this meeting urges the companies to reduce the time on duty at one stretch to ten hours, or as near to that limit as possible.

5. Resolved—That this meeting of enginemen and firemen views with great satisfaction the introduction of the *Railway Herald* as an impartial and useful railway paper; that it considers the insurance of £25 a great boon to railway servants, and wishes the paper every success.

6. Resolved—That this meeting views with the utmost satisfaction the appointment of Mr. C. E. Stretton, C.E., to the position of consulting engineer to the Society, and heartily thanks him for his services in the chair, and for his lecture.

7. Resolved—That a vote of thanks be given to Mr. Ball, assistant secretary, for his attendance and able address.

After which a most enjoyable meeting was brought to a close at 5.0 p.m.

The outcome of this meeting will give an increased membership of upwards of twenty enginemen and firemen to our branch. At 7.30 p.m. we assembled at our usual meeting-house, the Drovers' Inn, for the ordinary business of the branch, when we had a very good attendance, contributions being well paid up, and the new members enrolled; that being concluded, Messrs. Stretton and Ball again briefly but very suitably addressed the meeting, which was heartily appreciated, and thus we brought to a close one of the most interesting and successful days in connection with the Openshaw branch.

Yours fraternally,
J. Harrison, Secretary.

BRANCH MEETING HOUSES.

Sheffield.
Albion Inn, Johnson Street, Wicker. Alternate Sundays.

Pontypool.
Hanbury Hotel, Griffiths Town, Newport, Mon.

Neath.
Three Cranes Inn, Wind Street, Neath. Alternate Sundays, at 7.30 p.m.

Leeds.
Prince of Wales Hotel, Mill Hill. Last Monday in month, at 11.0 a.m.

Liverpool.
American Tavern, Byrles Street, Toxteth Park. Held fortnightly.

Bradford.
Granby Hotel, Union Street, Bradford. First Sunday in month.

Llanelly.
Neptune Hotel, New Dock, Llanelly.

Sandhills.
Brown Cow, Walton-on-the-Hill. Alternate Sundays.

Swansea.
Monthly—Landore Coffee Tavern. Saturday, at 8.30 p.m.
Quarterly—Oram's Coffee Tavern, Wind Street, Swansea.

Nottingham.
Mission Room, Queen's Walk, Nottingham. Every Monday at 8 p.m.

Bristol.
Phœnix Hotel, Totterdown. Every fourth Sunday at 7 p.m.

Plymouth.
At Mr. Sleeman's, 31, Harwell Street. Last Sunday in Quarter at 6.30 p.m.

York.
Adelphi Hotel, Railway Street, York. Alternate Sundays at 8 p.m.

Paddington.
Builders' Arms, Westbourne Park, London. Every third Sunday.

Newport.
New Bridge Inn, Bridge Street. Alternate Sundays, from May 6th.

Bow.
City Arms, Devons Road, Bromley. Fortnightly, on Fridays.

Openshaw.
Drovers' Arms, Ashton Road, Openshaw. Alternate Sundays at 7.30 p.m.

Mexborough.
South Yorkshire Hotel, Mexborough. Last Sunday in the month at 7.0 p.m.

Stockport.
Nicholson's Arms, Lancashire Hill. Last Sunday in the month at 6.30 p.m.

Birmingham.
Small Heath Hotel, Coventry Road. Alternate Sundays.

Battersea.
The Two Brothers, New Road, Battersea, London.

Retford.
Oddfellows' Arms, London Road, South Retford. Monthly at 8 p.m.

Lincoln.
Arcade Coffee Tavern, Lincoln. Last Sunday in the month.

Stratford.
Railway Inn, Angel Place, Stratford, London.

Wolverhampton.
Gladstone Inn, North Road, Wolverhampton. Meetings held monthly.

Grimsby.
Friendly Society Hall, Lower Spring Street. Alternate Sundays at 10 a.m.

Birkenhead.
Borough Hotel, Birkenhead. Meetings alternate Sundays.

Reading.
Blagrave Arms, Blagrave Road, Reading. Meetings Monthly, at 8 p.m.

Blackburn.
Dolphin Hotel, Blackburn.

Peterborough.
Pavilion Hotel, Park Road.

Stourbridge.
At Mr. Barnetts, The Mitre Hotel, Stourbridge. Monthly, Sundays.

Manchester.
Tower Hotel, Cathedral Yard. Every alternate Sunday at 7.0 p.m.

Tondu.
Llynvi Arms, Tondu, South Wales.

King's Cross.
The City of London Hotel, York Road, Cattle Market, London. Meeting nights for year—August 12th, Sep. 2nd, Sep. 23rd, Oct. 7th, Nov. 4th, Dec. 2nd, Dec. 16th.

Cardiff.
Great Western Coffee Tavern. Last Sunday in the month, at 3.0 p.m.

Branch Secretaries will oblige by sending us the time and place of their Meeting Houses.

HONORARY MEMBERS ADMITTED IN 1888.

Messrs. Tippetts & Sons, Solicitors, Maiden Lane, London, E.C.

Mr. A. Maxwell, Duke of Clarence, St. Pancras Road, London.

Mr. L. Beaumont, Adelphi Hotel, Railway Street, York.

Thos. Lough, Esq., 5, Newton Grove, Bedford Park, Chiswick.

Mr. F. Ward, King's Cross, London.

Mr. G. F. Broach, City of London Hotel, York Road, London.

Mr. F. Orum, Proprietor of Restaurant, 51, Wind Street, Swansea.

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LIST OF BRANCHES.

We have now branches at the following places:—

Sheffield
Neath
Plymouth
Exeter
Oxford
Leeds
Cardiff
Lincoln
Wolverh'ton
Skipton
Retford
Carnforth
York
Llanelly
Mexborough
Nottingham
Newport
Pontypool
Toton
Sandhills
Swansea
Liverpool
Bristol
Grimsby
Gloucester
Birmingham
Peterboro'
Bradford
Openshaw
Stockport
London Branches—
Bow
Battersea
Kentish Town
Paddington
King's Cross
Stratford

* * *

BRANCHES OPENED THIS YEAR.

Reading
Manchester
Birkenhead
Blackburn
Tondu.
Stourbridge
Worcester

LOCOMOTIVE ENGINEERS AND FIREMEN'S

Monthly Journal.

"This that they call Organization of Labour is the universal vital problem of the world. It is the problem of the whole future for all who will in future pretend to govern men."—THOMAS CARLYLE.

"I know no better definition of the rights of man:—Thou shalt not steal; Thou shalt not be stolen from; what a society were that—PLATO'S REPUBLIC, MORE'S UTOPIA, *mere emblems of it! Give every man what is his—the accurate price of what he has done and been—no more shall any complain, neither shall the earth suffer any more."*—THOMAS CARLYLE.

VOL. 1. SEPTEMBER, 1888. NO. 8.

SHE KILLED HER HUSBAND.

"I DO think, Harold, you might let me have a little more money!" said Victoria Hale. She sat at the breakfast table, and very pretty she looked, a pout upon her cherry lips. She wore a pretty morning dress of fluted white lawn, with a breakfast cap of muslin and pink ribbons, very becoming to her clear olive skin, and large, velvety black eyes.

Her husband, though thirty years her senior, was quite as distinguished in appearance. Harold Hale was the chief book-keeper and cashier in a large private London bank, and had been married about three months. He was beginning already to discover that his divinity was not all divine.

"More money," he repeated, "you are unreasonable. Do I not keep you supplied with all that I have to spare?"

"But it's so very mortifying to go shopping with Mrs. Hyde Secor and Mrs. Bonnington and have to stand by while they are purchasing the sweetest things at such bargains."

"Don't go shopping with them."

"You will shut me up, then, from all amusement and society?"

"Nonsense, Vic. You know better than that. Here are your pretty house, your garden, and your little conservatory to amuse you."

"One cannot be contented with the same thing for ever."

"If you wanted a perpetual change you should have married a millionaire."

"Don't be cross, Harold," said Victoria, coaxingly. "But you know all our neighbours at Richmond here are well-to-do, and I don't want to be left behind. I shall be mortified to death if I can't have a croquet party in August."

"I have no special objection to that," said her husband. "I suppose it need not necessarily be expensive."

"And I need another new lace parasol terribly. And oh, Harold, Mrs. Lacy says I may use her cream-coloured ponies while she is away at Bournemouth. Our stable room will do for them if we turn Polly out to grass. Isn't it kind of her?"

"I dare say its very kind," said Harold ruefully; "but you know a pair of ponies cost keeping."

"And the new washing summer silk that is such a bargain at T——'s?"

"Yes, yes, yes; only remember, Vic, that there is a limit to our funds."

"I will not forget that."

Mrs. Hale, satisfied with her husband's reluctant consent, gave the croquet party, whirled down the suburban roads and into the park with the borrowed ponies; bought the lavender summer silk and a love of a lace shawl to go with it; accepted an invitation to visit Windsor Park, and later on go to St. Leonard's with a party of gay young folks, and cried all night because her husband gave out a hint about extravagance.

"Vic, you don't understand," said Harold. "We must study economy or we shall go to ruin."

"Economy," retorted Victoria; "I am sick of the very word."

Her husband turned silently away. It was hard thus to be repulsed when he had most need of sympathy.

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"They tell me," said old Mr. Hardie, "that Hale's wife dresses the most elegantly of anyone at Hastings this season."

"What? Hale who keeps Denny's books—young Hale?"

"Yes."

"The deuce! How can he afford it?"

"Ah! that's a different matter. If I were Denny, I should keep an eye to things."

"They've had some serious lessons already," said the other. "That burglary a month back cost them as good as £2,000."

"Any trace of the burglar?"

"No. The safe must have been opened by skeleton keys."

"Humph!" grunted Hardie. "If the cashier was anyone but Hale, that Denny trusts as he would trust himself——"

"Oh, nonsense, nonsense!" cried the other old gentleman. "There's such a thing as being too suspicious! You'll be saying next that Hale is at the head of a gang of robbers."

Meanwhile, Reginald Denny began to be strangely mistrustful; not of Harold Hale, but others about him.

"Hale," said he, "sometimes I think those robbers are nearer home than anyone imagines, though the police declare the whole thing a mystery."

Do you, sir?" A ghastly look came over the man's features. "I think it quite impossible."

"At all events it is worth looking into," said Denny. "The circle of suspicion seems to be narrowing slowly, and we continue to miss cash most inexplicably, and notes as well. Do you mind sitting up for a night or two?"

"Not at all, sir, if you desire it."

"I'm sorry to ask it of you, as you don't seem well this last week or two——"

"Pray don't mention it. I am well enough," said Hale, almost impatiently.

It was the first night of his vigil—a dark, tempestuous night, with rain falling outside. Reginald Denny had gone home, but some unanalysed notion induced him to return quietly and by stealth towards one o'clock in the morning. Letting himself in by his own private key, with a word of reassurance to the alarmed watchman, he noiselessly entered the banking-rooms.

The safe where the money and valuable papers were kept was wide open. Kneeling before it, with both hands full of notes, hurriedly transferring some to an open leather case on his right hand, and putting others back was Harold Hale himself.

In an instant Reginald Denny's iron grasp was on his arm.

"So I have got at the root of the matter at last," said he, in a deep, stern voice. "So you are the burglar, Harold Hale!"

White with rage and dismay, Hale sprang to his feet and confronted the man whom he had so long been systematically robbing.

"You have discovered me," he cried in stifled accents, "but you shall never convict me."

There was a vivid flash, the report of a pistol, and the next instant Harold Hale lay dead before the eyes of the horrified banker.

"It was not his own fault so much as it was his young wife's," people said, when the ugly facts connected with Harold Hale's suicide leaked out. "He was weak, but not naturally wicked, and she persecuted him mercilessly for money. Poor girl! her dress and fashion and luxuries were dearly bought."

And Victoria Hale, sitting pale and agonised in her deep widow's weeds, knew as well as if supernatural hands had written it in fiery letters on the wall, that she had murdered her husband!

Scientific.

LOCOMOTIVE CHIMNEYS.

If we compare the practice of several English and foreign railways, we find great differences in the proportions and in the shape of the chimneys of locomotives. However, it may be stated that in England the chimney receives now the conical form, whereas formerly the cylindrical one was generally in use. It does not seem, however, that uniformity has been arrived at in the case of conical chimneys, for we find that on some railways the small base of the frustrum of cone forming the chimney is at the top, whilst in some other cases it is at the bottom. Now, what can be the cause of these divergences in practice? We must say that for our part we fail to understand the motives which led the designer to place the smaller section of the chimney at the top.

Some years ago one of the great pioneers in the science of Thermodynamics, Doctor Eustav Zeuner, investigated this question from both a practical and theoretical point of view. Zeuner's results confirm in many instances the previous experiments of D. K. Clark. However, Zeuner was the first who gave the formula expressing the relation between the volume of steam exhausted and the volume of air passing through the grate at the same time. It is not our intention to reproduce here the formula, or to explain how it was obtained. We shall, however, remark here that this formula contains the ratio of the two end areas of the chimney. If this ratio is made equal to 1, that is to say, if the chimney is cylindrical, the ratio of the weight of the gases exhausted to that of the exhaust steam is, say 2·45. Now, if we retain the same blast pipe area and boiler proportions, but replace the cylindrical chimney by a conical one, the smaller area of which is at the bottom and about 0·6 of the larger one, we find that the above ratio becomes 2·78, so that the conical chimney draws $\frac{2\cdot78}{2\cdot45}$ or 1·14 times more air through the grate than the cylindrical one. Had the small base been at the top of the chimney instead of the bottom, the ratio would have been about 2·7, so that there is no gain obtained by this arrangement, sooner a loss. We therefore do not see that this arrangement is any way justifiable; the resistance to the escape of the mixture of exhaust steam and gases is certainly increased. It may be urged that the inverted conical shape prevents the re-entrance of air into the chimney owing to the steam filling it up completely, but we will reply to this that by a suitable choice of the larger diameter of the usual form of conical chimney, we can avoid the re-entrance of air. It is not necessary for this purpose to go over a lot of stiff calculations; a simple diagram will give the desired result. It will be remarked that the formula contains only the ratio of the two sections. Now, if no air is to penetrate in the chimney, the cone of exhaust steam must fill it up entirely, but not touch its sides save at or near the top. The form of the cone depends upon the area of the blast nozzle; the height of the chimney top is also fixed so that the larger diameter may be fixed by a simple drawing under the condition that the steam cone shall touch only the upper part of the chimney. The height of the blast nozzle may be shifted a little so as to keep a required ratio between the two end areas of the chimney; the smaller one of which (decidedly too small in many recent locomotives) should be $\frac{1}{10}$ of the surface of the grate, or $\frac{1}{25}$ of the total cross section of the tubes.

Practically the advantages resulting from a conical chimney are not so manifest. We find from our own experience that when the axis of the blast-pipe is somewhat out of truth—not in line with the chimney's axis—it gives worse results than a cylindrical chimney working under the same bad conditions. Some engineers will not hear anything about conical chimneys, and prefer a straight chimney, the diameter of which is equal to that of the cylinder; it is not exactly known why this proportion has been adopted; it is said it is the outcome of practical experience. We like to believe it, but would prefer to see this matter investigated more fully than it has been.

As for the top of the chimney, engineers are again divided as to the proper shape to give to it. Some contend that it is adapted not only for the sake of adorning the chimney, but also to divide the current of air so that it shall offer less resistance to the issuing gases and exhaust steam. This point is very difficult to establish, but we do think that a small chimney top as that adopted on the Great Northern Railway, improves the look of the chimney, if it is not otherwise useful.

The height of the chimney is limited by the height of the bridges, tunnels, etc., above the level of the rails. The high position of boiler axis in our modern engines above the rails compels the designer to give his engine a chimney shorter than it is deemed advisable to make it. Practical experiments have shown that this height should be between 3 or 4 times the least diameter of the chimeny. Above this proportion nothing is gained, but it is always easy to obtain the proper proportion by letting the chimney come down to the first row of tubes or so; a plate across the top of the smoke-box supports the chimney, and divides the smoke-box into two parts. This arrangement protects the joint of the steam-pipe with the tube plate and the branch-pipes to the cylinders.

Chimneys are generally made of iron plate $\frac{3}{16}$ to $\frac{1}{4}$ of an inch thick; the Austrians make them of cast-iron, they are then more durable, more easy to make, and may act as additional load to equalize the weight on the leading axle in locomotives with overhanging fire-boxes. Cast-iron chimneys are generally $\frac{5}{16}$ to $\frac{3}{8}$ of an inch thick, and formed in two parts, the joint of which is accurately turned. This arrangement permits to easily re-set the exhaust of pipe if it is out of truth, care being taken to erect the chimney accurately once for all.—*Railway Herald.*

◆

STRANGE THINGS ABOUT STEAM.

When water once begins to boil, it is impossible to raise its temperature any higher; all excess of heat is absorbed by the escaping as so-called latent heat, and is given out again when it condenses. We often speak of seeing the steam escaping from the spout of a kettle, but this is incorrect; steam is an invisible vapour, and we can no more see it than we can air. What we do see are the minute drops of water into which the steam condenses on coming into the cool air. If we boil water in a glass flask, we shall notice that nothing can be seen in the interior; and by observing the steam escaping from a kettle, we shall notice that there is quite a distance between the end of the spout and the point where the cloud becomes visible. This cloud of steam is of exactly the same nature as the clouds which float in the sky, and which are formed by the condensation in the cool upper regions of the steam or aqueous vapour present in the air.—*Stationary Engineer.*

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THE ORIGIN OF PETROLEUM.

Professor Medelejef has advanced the theory that petroleum is of mineral origin, and that its production is going on and may continue almost indefinitely. He has succeeded in making it artificially by a similar process to that which he believes is going on in the earth; and experts find it impossible to distinguish between the natural and the manufactured article. His hypothesis is that water finds its way below the crust of the earth, and then meets with carbides of metals (particularly of iron) in a glowing state. The water is decomposed into its constituent gases. The oxygen unites with the iron; while the hydrogen takes up the carbon and ascends to a higher region, where part of it is condensed into mineral oil, and part remains as natural gas, to escape where it can find an outlet, or to remain stored at great pressure until a borehole is put down to provide it a passage to the surface. Oil-bearing strata occur in the vicinity of mountain ranges; and it is supposed that the upheaval of the hills has sufficiently dislocated the strata below to give the water access to depths from which it is ordinarily shut out.

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PRESERVING ICE IN THE SICK ROOM.

A convenient and efficient method of keeping ice in small quantity in a sick room for a considerable time is as follows: Cut a piece of flannel about nine inches square, and secure it by a ligature around the mouth of an ordinary tumbler, so as to leave a cup shaped depression of flannel within the tumbler to about half its depth. In the flannel cup so constructed pieces of ice may be preserved many hours, all the longer if a piece of flannel from four to five inches square be used as a loose cover to the ice cups. Cheap flannel, with comparatively open meshes, is preferable, as the water easily drains through it, and the ice is thus kept quite dry. When good flannel with close texture is employed, a small hole must be made in the bottom of the flannel cup, otherwise it holds the water and facilitates the melting of the ice.

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HOW TO SEE ONE'S OWN BRAIN.

Dr. Fraser Halle some years ago communicated a remarkable discovery to the *English Mechanic and World of Science.* Fifty years have elapsed since Purkinjê observed that by passing a candle to and fro several times by the side of the eye the air in front was transformed into a kind of screen, on which was reflected what was then supposed to be "a magnified image of part of the retina." Sir C. (then Mr.) Wheatstone believed it to be "the shadow of the vascular net-work." Mayo thought it was "an image of the blood-vessels of the retina." Sir Benjamin Brodie, to whom Dr. Halle wrote on the subject, could not identify it with any part of the retina, and said that it was to him "really incomprehensible." By means of more careful drawings, Dr. Fraser Halle resumed the exploration, and succeeded in identifying the picture with the representation of the "anterior lobe of the cerebrum." The picture consists, he has long observed, of "red convolutions with dark interspaces," among which a whitish admixture is sometimes visible. These, he says, constitute exactly the image of folds of the anterior lobe of the brain with the furrows between them. The candle should be moved to and fro about four inches below the eye, and three and a quarter inches from the face. When the movement ceases the undulations, of course, also cease, and the image disappears. A reddish mist appears first, and the image is soon developed and defined. Night is the best time for it, but it can be seen in a dark place faintly in the daytime.—*Cassell's Saturday Journal.*

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HORSEFLESH OR BEEF.

The question whether beef or horseflesh is the more suitable diet for human consumption has long ago been settled in favour of the former by the common practice alike of civilised and savage races. An argument founded on theoretical grounds could hardly lead to any other conclusion. There can be no doubt that the flesh of the well-fed and easily circumstanced ox is far less likely to resist the work of digestion and assimilation than the stringy fibres of an animal whose life is a fairly constant round of muscular exertion, and in the majority of cases of overwork. Professor Gamgee has stated that bad effects are apt to follow the ingestion of the meat of overdriven animals, and if his observation be correct in the case of animals generally it cannot but apply to that of the horse. Apart, however, from any question of direct morbific influence, the quality of such meat must be, and is, inferior. Deficient in fat, it lacks what is probably the chief source of supply for the wear and tear of vital energy, while the proteids it contains are embodied in a dense tissue difficult of assimilation. However acceptable the flesh of the horse may be, therefore, when it alone is obtainable, it is certainly not to be compared as a food to ordinary butcher's meat, and to pass it off as beef (a practice by no means unknown) is a fraud not only disreputable, but distinctly, if not in a high degree, injurious. The summary conviction and punishment of a butcher in Manchester a few days ago for practising this kind of imposition may serve as a warning to others who may be disposed to follow his example. At the same time, it is evident that, however deterrent the penalty imposed, it will be difficult to eradicate this form of unfair dealing unless the poorer classes of customers are watchful to protect their own interests against unscrupulous salesmen.—*Lancet.*

LIGHT FROM THE STARS.

It has been found by experiments on the light emitted by the stars of different order of magnitude, that the light of a star of the sixth magnitude amounts to only one-hundredth part of the light of a star of the first magnitude. Hence we conclude (always supposing the stars to be of equal magnitude and splendour), that a star of the sixth magnitude is ten times more remote than a star of the first magnitude. Now the bright star Alpha Centauri may be considered as typical of a star of the first magnitude. Combining our knowledge of the relative distances of Alpha Centauri and the stars of the sixth magnitude with the conclusions above arrived at, it follows that if Alpha Centauri were transported to 750 times its actual distance, it would still be visible in Herschel's 20-ft. reflector, and consequently there might be perceptible in such an instrument a star the distance of which is 750 times greater than the actual distance of Alpha Centauri. Now the absolute distanct of Alpha Centauri from the earth, as ascertained by the researches of various astronomers, may be stated in round numbers to be 20,000,000,000 of miles. Hence we arrive at the conclusion that the distance of the stars which are faintly visible in a 20-ft. reflecting telescope, such as Herschel employed in his observations, is not less than 15,000,000,000,000 of miles. Light, which traverses space with a velocity equal to 186,000 miles in a second, would occupy more than 2,000 years in passing from such a star to the earth. Well might Herschel remark that the visibility of a star in the present day is proof—not of its actual existence, but rather of its having existed for hundreds of thousands years ago.

LONGEVITY OF TREES.

From observations made on specimens still in existence, the longevity of various trees has been estimated to be, in round numbers, as follows :—

	Years.
Deciduous Cypress	6,000
Baobab trees	5,000
Dragon tree	5,000
Yew	3,000
Cedar of Lebanon	3,000
"Great trees" of California	3,000
Chestnut	3,000
Olive	2,500
Oak	1,600
Orange	1,500
Oriental Plane	1,200
Cabbage Palm	700
Lime	600
Ash	400
Cocoanut Palm	300
Pear	300
Apple	200
Brazil Wine-palm	150
Scotch Fir	100
Balm of Gilead	50

THE COLOURS OF THE ALPINE SKY.

When the Alpine sun is setting, or, better still, some time after it has set, leaving the limbs and shoulders of the mountains in shadow, while their snowy crests are bathed by the retreating light, the snow glows with a beauty and solemnity hardly equalled by any other phenomenon. So, also, when illuminated by the rays of the unrisen sun, the mountain heads, under favourable atmospheric conditions, shine like rubies. And all this splendour is evoked by the simple mechanism of minute particles, themselves without colour, suspended in the air. Those who referred the extraordinary succession of atmospheric glows, witnessed some years ago, to a vast and violent discharge of volcanic ashes, were dealing with "a true cause." The fine floating residue of ashes would, undoubtedly, be able to produce the effects ascribed to it. Still the mechanism necessary to produce the morning and the evening red, though of variable efficiency, is always present in the atmosphere. I have seen displays, equal in magnificence to the finest of those above referred to, when there was no special volcanic outburst to which they could be ascribed. It was the long-continued repetition of the glows which rendered the volcanic theory highly probable.

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THE EDISON PHONOGRAPH.

A London correspondent of the *Yorkshire Post* says: "I recently had the privilege of being introduced to the greatest inventor of the age, Mr. Edison. Mr. Edison was in New York and I was in London, in Colonel Gourand's drawing room, at Little Mento, Surrey, but that did not matter, Colonel Gourand is Mr. Edison's representative in Europe, and the possessor of the European rights in the Phonograph, and he desired to introduce it to an English audience.

First I will explain the principle of the invention. The motive power is an electric battery. Speaking is done into a mouthpiece; the sound waves set up by the act of speech, or song—or noise of any kind—are projected upon a diaphragm. This diaphragm sets in motion a minutely-pointed needle. Beneath this needle is a revolving cylinder; upon this cylinder is slid a thin, light, cylindrical, wax-like substance which is called the phonogram. The point of the needle when set in motion by the sound wave touches the phonogram and traces a series of indentations. These are literally photographs of sound. When you leave off speaking there is the record of what you have said. To reproduce that record all that has to be done is to set the machine in motion by the battery. The indentations then act upon the needle's point, which vibrates to the diaphragm, and the diaphragm throws out the exact sound it receives. The whole thing is beautifully simple and yet wonderfully ingenious. The voice thrown out is an exact reproduction of the voice projected into the machine. Phonograms to which Edison had spoken in New York and which had been sent by mail to Colonel Gourand, were put on the machine and gave forth their message. Edison's voice is harsh, high, loud, and strong, but there it was, nevertheless. Edison's voice was heard in a variety of ways, in speech, in song, in shouting, in laughing, and in crying—all having been sent from America by post. Then Colonel Gourand spoke and sang, and gave an inimitable sketch of an irate Gaul's struggles with the English language. Each subtle modulation of tone was perfectly reproduced. Everyone was astonished. Among the company were "La Belle Siffleuse" (Mrs. Shaw), a tall, handsome, American brunette, who has lately astonished London by her marvellous whistling. She whistled a difficult air into the phonograph, and her whistling was indeed a musical revelation. But the best of it was that, an hour after she had left, the whistling was reproduced at will on the phonograph. The phonograph gave us pianoforte solos, cornet solos, songs, duets, and I don't know what besides. Then Colonel Gourand introduced each guest to Mr. Edison through the phonograph by name, and each guest said a few words of congratulation to the great inventor. Six or seven days hence he will receive these phonograms by post, and hear congratulations in the voices of those who were yesterday at Little Mento. Thus I was introduced to Mr. Edison while he was in New York and I in London.

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FEEDING AND STIMULATION.

All the vital functions are more or less processes of combustion, and they are subject to laws similar to those which regulate the burning of coal in our fireplaces. The reason why we allow our fires to burn low or go out altogether, is that we put on too much coal, or that we allow them to be smothered in ashes. It is the child who pokes the fire from the top to break the coal and make it burn faster; the wise man pokes it from below, so as to rake out the ashes and allow free access of oxygen.

And so it is with the functions of life, only that these being less understood, many a man acts in regard to them as the child does to a fire.

The man thinks that his brain is not acting because he has not supplied it with food. He takes meat three times a day, and beef tea, to supply its wants, as he thinks, and puts in a poker to stir it up in the shape of a glass of sherry or a nip at the brandy bottle.

And yet, all the time, what his brain is suffering from is not lack of fuel but accumulation of ash, and the more he continues to cram himself with food and to supply himself with stimulants, although they may help him for the moment, the worse he ultimately becomes, just as the child breaking the coal may cause a temporary blaze but allows the fire all the more quickly to be smothered in ashes. It appears that vital processes are much more readily arrested by the accumulation of waste products within the organs of the body than by the want of nutriment of the organs themselves.

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WHAT IS TRACHEOTOMY?

The opening of the trachea or windpipe is made for the purpose of admitting air to the lungs when its entrance is obstructed in the passage above. It is usually performed just below the mass to be felt and seen in the neck and known as the "Adam's apple." If the obstruction is temporary in character the life of a person may thus be prolonged until the passage is again clear. A double tube, one within the other, is commonly used, so the inner tube may be withdrawn and cleaned without disturbing the wound each time. As the air admitted to the lungs in this way passes directly to the lungs instead of passing through the nose or mouth, it becomes necessary to have it warm and free from dust, or dangerous irritation may result. With such care and under favourable conditions, air can thus be supplied for days and weeks, giving opportunity for recovery or relieving difficult breathing where recovery is impossible. The operation is therefore performed with the hope of saving life in the one instance, and a measure of relief simply in another.

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IMITATING ROSEWOOD.

Various methods have been devised for treating the surface of certain woods so as to produce imitations of rosewood, walnut, and other choice varieties. Some of the most attractive work in this line, however, is effected by simply spreading on the surface of the material a concentrated solution of hypermanganate of potassa, this being allowed to act until the desired shade is obtained. Five minutes suffice ordinarily to give a deep colour, a few trials indicating the proper proportions. The hypermanganate of potassa is decomposed by the vegetable fibre with the precipitation of brown peroxide of manganese, which the influence of the potassa, at the same time set free, fixes in a durable manner on the fibres. When the action is terminated, the wood is carefully washed with water, dried, and then oiled and polished in the usual manner. The effect produced by this process in several woods is really remarkable. On the cherry, especially, it develops a beautiful red colour which resists well the action of air and light, and on other woods it has a very pleasing and natural effect.

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RAILWAY PASSENGERS IN INDIA.

Over 95,000,000 persons travelled by railway in India last year, 89,000,000 being third-class passengers.

Miscellaneous.

THE POCKET HANDKERCHIEF.

This is of comparatively modern introduction, not being met with earlier than the 16th century, or the reign of Queen Elizabeth. In one of its primitive forms it denoted the towel or cloth employed to wipe the face or the hand. Hence its Lincolnshire appellation "hand-cloth," which was worn on the left side of the Anglo-Saxons, and carried in the hand in the Middle Ages. Henry VIII. used "handkerchers of Holland, fringed with Venice gold, red and white silk," others edged with gold and silver, and some of "Flanders' work." Among the New Year's gifts to Queen Mary (Tudor) in 1556, were "six handkerchers edged with gold and silk," presented by Mrs. Penne, nurse to the late King Edward. But with Elizabeth we find frequent allusion to the laced handkerchiefs, which at this period came into fashion, an illustration of one of which is given by Mr. Fairholt, in his "Costume of England." They appear to have been composed of silk and cambric, richly embroidered and trimmed with gold lace. As might be imagined, high prices were paid for them; and much enterprise was displayed in their production. It is interesting, also, to note how the term handkerchief in its present signification has arrived at the modern form. Thus, originally, the word kerchief denoted a covering for the head; but later on, as in Shakespeare's time, it meant a muffler used by sick people to keep the neck warm. Hence, in "Julius Cæsar," we read:—

> O, what a time have you chose out, brave Caius
> To wear a kerchief; Would you were not sick.

Having thus slipped from the head to the neck it applied, "to any square of material for the purpose of wiping the face, and so became handkerchief." In this sense Shakespeare uses the word, a good example of which occurs in "Othello," where Iago has these words—

> Such a handkerchief,
> I am sure it was your wife's, did I to-day
> See Cassio wipe his beard with.

Then when carried in the pocket, it assumed its full form, "pocket-handkerchief," but not until the world has gone through a succession of modifications.

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THE SIZE OF GREAT CITIES.

British people, and especially Londoners, are apt to think that, as London is now the largest and most populous city in the world, it must still more certainly be larger and more populous than any city known to ancient history. It is well occasionally to know the truth, even if it abates our pride. We have records of three great cities, Nineveh, Babylon, and Rome. Of Nineveh we are told that it was a city of three days' journey, and Jonah spent a day's journey in getting well into its midst. But it is thought that these vast distances refer to a group of four cities, very near to each other, but not united. Of Babylon we know that it was built four-square, and that each of its walls was 12 miles long. It therefore included 144 square miles of ground, while London, in its greatest extent, covers less than 120 square miles. Rome was much smaller in area than Nineveh, Babylon, or London, being only seven miles across and 21 in circuit, while London is at least 42 miles in circuit. But there is some reason to believe that Rome in the first three centuries after Christ contained at least five million people. Some scholars say 10 or even 15 millions. Gibbon tells us that there were 1,780 great houses or palaces, and 46,602 houses let out in flats and single rooms, but by reckoning only 25 people to each house he makes up only 120,000 inhabitants. As to the palaces, we know that they each contained hundreds of people, and on one occasion 400 slaves were brought out of one house to be executed. Another house was owned by a widow lady of private fortune, who wished to emigrate. The house in Rome was left for her son, and it contained 400 slaves. Even if we take an average of 200 slaves and other occupants, these palaces must have contained 350,000 people. The 46,602 houses let in flats and rooms must have held more than 100 persons in each. They were six and eight storeys high, and were so closely packed that every room let for a large sum. Juvenal tells us that one year's rent of a miserable chamber or an attic in Rome would buy the freehold of a comfortable house 20 miles away. A year's rent of an attic in London would be about £10, but that would not buy a freehold house at St. Albans. We may take it that a single room on the top floor in Rome would let for at least £100 of our money. Gibbon says £300 or £400 on the authority of the residents. But Juvenal is a safe guide, and in his time it was at least £100. If this is correct, we may be quite sure that the 46,602 houses let in flats and chambers contained more than five million people. Gibbon's estimate is very much as if we should reckon 25 people to a block of Peabody's buildings. But while we allow Rome to have been as populous, and perhaps twice as populous as London, we have the best of it in all other ways. Rome was miserably unhealthy. The streets were narrow, and the people crowded together like pigs. Their only consolation must have been that they did not live, but only slept, in their garrets. There were no great open spaces like Hyde Park or Regent's Park. On the other hand, there were enormous public baths, which were free to all, and the bathers were liberally supplied with oil at the public cost. But, as far as mere numbers go, we do not esitate to say that Rome was greater even han the London of to-day.

A TREBLE EXECUTION.

Three criminals -- two men, named Camarasa and Cantalejo, and a woman named Pozuelo—were recently executed in Madrid. The following is an account of the closing scene as described by an eyewitness: At 6 a.m. the executioner came to superintend the last toilet of the prisoners. The Castilian Jack Ketch and his assistant are in the habit of asking those condemned to death to forgive them before being robed for the scaffold. So the executioner kneels before the convict and says: "Ave Maria Purrissima, my brother in Christ, thou knowest the sad mission that brings me here; I am the hangman! Dost thou forgive me?" Then with the assistance of the Brothers of Peace and Charity, he places on each man or woman a sort of robe in black merino, with broad sleeves, which is very much like a judge's gown. On the head of the men is put a cap that has a yellow cross in front, and on the head of the woman a woollen handkerchief, also adorned with a yellow cross. Then the prisoners' arms are tightly pinioned to the body at the elbows, and irons fastened around the ankles so as to permit the taking of only short steps. And now the poor souls are forced to remain a whole hour in the Capilla, while priests recite aloud the rosary and the prayers for the dying. Directly it was announced that all was ready, the doors of the prison yard were opened. The parish priest of the prison led the lugubrious procession, bearing aloft a crucifix. A couple of priests followed. Then came Camarasa, who had to be almost carried by the Brothers. More priests followed, praying aloud. The doomed man was soon placed on the first little bench in front of one of the posts, the ring was fixed round his bare throat, a cap drawn over his face, and the executioner and his *aide* quickly stepped behind, ready to give the iron bar a twist that nstantly crushes the the prisoner's neck between the ring and post. In less than four minutes after he appeared on the scaffold the first victim was despatched, and a second group of priests and Brothers brought Cantalejo to the next bench, close to the now lifeless body of his accomplice. The woman, who had asked to be executed last, was literally carried up the steps of the scaffold and seated almost senseless. The whole tragic affair lasted about 13 minutes; and the executioner, who was the last person to leave the scaffold, now uncovered the faces of the three bodies in order to let the crowd gaze at their disfigured features until one hour before sunset.

THE SIBERIAN RAILROAD.

Russian government engineers have commenced making surveys for a railway across Siberia. It has been decided that the line shall be as direct as possible, and only touch the centres of trade in Siberia, the main object being to connect Siberian and European Russia, particularly in case of war. The route proposed starts from Zeatourt, in the Ural Mountains, and thence runs through the Ishem Government, Omsk, Tomsk, along the north shore of Lake Baikal, the upper River Ura, the Amoor gold fields, River Zay, Bureia, the Ussuria Valley, and thence to Vladivostock, the Russian naval port in the North Pacific. The line will be about 4,000 miles long. The Russian Government proposes to carry out this gigantic undertaking entirely with Russian money. The line is estimated to take about five years in building, and the entire cost is put down at 800,000,000 roubles, or about $350,000,000. There will be five gigantic bridges along the route, the total cost of which is alone estimated at $35,000,000. The sudden impetus given to this new line of railway is caused by the Canadian Pacific Railway, which has given England an immense superiority over Russia in the North Pacific in case of war. Within a few years Russia will also be in direct communication with the Atlantic Ocean, via Finland, Sweden, and Norway. This line will be a convenient outlet for trade, as the western terminus, the port of Lafoden, is never frozen in the winter, when all the Russian ports on the Baltic and White Sea are closed for several months. Lafoden will not, however, be available for military purposes, as it is situated in Norwegian territory.

ONE MILLION POUNDS.

Few of us when we read of the fortune of a millionaire, or of the millions we spend every year in the manufacture of weapons of destruction, have any clear idea of what a million sovereigns really represent. We all know what a sovereign is, and most of us have possessed one at *some* period of our lives, though they are by no means too plentiful; but we become quite bewildered when we think—if we ever do *really* think—of them by the million. To form some idea of what one single million really is, let us imagine 1,000,000 sovereigns laid side by side in one single line, and we shall find that the glittering track will extend 13½ miles, or all the way from London to Epsom. If it were possible to stack them in one single pile, they would reach a height of 4,902 feet, or 24 columns each two feet taller than the monument of London; if placed on a flat surface, they would cover a space of 36 yards long and 36 yards broad. Supposing we substitute half-sovereigns in the same way, we should get a single line 23⅝ miles long, and a pile 6,172 feet high, or 30½ London monuments of half-sovereigns. This sum represents the annual value of one halfpenny in the £ only, in the income tax assessment, and the income tax for last year yielded over £16,000,000. Fancy 384 London monuments of sovereigns.

THE CHEAP TRIPPER.

Up to about forty or fifty years ago travelling was a solemn act, not to be enterprised or taken in hand unadvisedly, lightly, or wantonly. Long after the days when even a brief journey involved no little risk to life and limb, the expense of travelling, the necessity for engaging places in the coach or bespeaking a private conveyance, and the time occupied in journeying from one place to another, kept down the number of travellers. "Day excursions" of some fifty miles are entirely modern pleasures. The "tripper" is not in the old-fashioned sense a traveller at all. He is merely a bird of passage—a day excursionist. He is frequently forbidden to carry luggage, save what he conveys in his arms, and is bound to journey to his goal and return from it on the same day.

Classes and ranks are greatly mixed in these days, and persons quite apart from the tripper proper occasionally imitate his actions in some respects. "First-class" travellers avail themselves of "day tickets" to visit country place or sea-side resorts, but these persons are no fair type of the genuine tripper. They dress and behave as they would in ordinary circumstances; there is nothing striking or peculiar about them. Far otherwise is it with the real "cheap tripper." His very raiment is entirely unlike anything worn, even by himself, at other times. Those wondrous checks, those gaudy ties, those peculiar hats! Do we ever behold them save on the persons of a group of cheap holiday excursionists on one of our railway platforms? The male tripper is usually more markedly eccentric in his apparel than the female, general dowdiness being usually the only distinguishing mark of her array. But the "tourist suit" of the tripper of the nobler sex is a thing to remember.

Another peculiarity of the cheap tripper is his power of song. Railway travellers of the every-day sort do not usually appear to have "music in their souls" as they hurry about the platform with anxious countenances, looking after baggage, and counting up members of their party. But the cheap tripper, who, like a royal personage, is travelling by his own special train, and has no luggage to trouble about, is always in overflowing spirits. When he rose early in the morning, and clad himself in that wondrous suit of "dittoes," he announced to his friend that he was "going out for a day's spree;" and he remains lively under the most unpropitious circumstances. He beguiles with song the weary waitings at railway stations and in sidings, where his train is constantly being shunted to let the express pass. Even the rain which usually falls on public holidays cannot damp his spirits; nay, a wet day has usually the effect of making him noisier, as the bad weather necessitates lengthened detention in public-houses, and consequent additional potations. The only thing which breaks in upon his flow of song and jest is the necessity for his consumption of a vast amount of light refreshments. It is not the least noticeable of the tripper's peculiarities that his mouth is rarely empty during his trip. No traveller of this class with any respect for himself would think of starting on a journey without a good store of nuts, gingerbread, apples, or any other cheap fruit in season, usually tied up in a coloured handkerchief. The consumption of these viands, and the subsequent utilisation of the rind, shell, or stones of the fruit as missiles to be playfully aimed at friends and railway officials, are among the amenities with which the tripper beguiles a lengthened journey.

As a rule, the tripper prefers the seaside to the country. Though a conspicuously bad seaman, he dearly loves a "sixpenny sail" in company with a crowd of fellow-sufferers. He likewise revels in wading in the surf, having his portrait taken on the beach, and throwing pebbles into the sea. Country pleasures are less to his taste; indeed, if he patronises a country excursion, it is usually for the sake of the "drive down" in a van or break. After his arrival, he generally vanishes into the nearest public-house, and only emerges in time for the homeward journey. Foreign countries are scarcely congenial to him. The language "bothers him," as he confesses, and he labours under a standing grievance of not getting enough to eat. Steaks and porter, and a good heavy English breakfast at nine a.m., are troublesome to procure abroad, if procurable at all; and the comestibles retailed at foreign railway buffets and seaside resorts are not of the kind in which the cheap tripper delights. He misses the pork pies, the gingerbread, the nuts, the beer, of his native land. There are many sea-side places in England entirely dedicated to the cheap tripper class. Here the excursionist is in his glory, and is to be seen at his best. All the resources of the place are arrayed with a regard to his taste and convenience. The eatables and drinkables that he loves, the kind of rubbish he likes to buy, the description of entertainments he elects to patronise, are all there; and those who desire to observe the cheap tripper attentively should visit some such excursion bourne on a Bank holiday.

NUMBER OF WESTINGHOUSE BRAKES ORDERED TO 31st DEC., 1887.

AUTOMATIC BRAKES.	Engines.	Carriages and Waggons.
Great Britain	2,207	18,224
France	2,262	17,715
Belgium	618	4,570
Austria-Hungary ...	70	885
Germany	432	2,873
Russia	136	212
Holland	440	2,268
Italy	144	638
Sweden	11	112
Spain...	8	17
India...	56	170
Australasia	424	2,183
America (*used on over 300 Railways*) ...	12,118	69,591
Totals to date ...	18,926	119,458
NON-AUTOMATIC BRAKES.		
United States	2,843	9,605
England and Colonies	68	399
Total: *Automatic and Non-Automatic* ...	21,837	129,462
	151,299	

PROGRESS OF WESTINGHOUSE AUTOMATIC BRAKES.

	Engines.	Carriages and Waggons.
Totals as above ...	18,926	119,458
Do. July, 1880 ...	3,277	13,502
Increase *in 7½ years*	14,649	105,956
	120,605	

Making an average of 1,340 sets per Month.

Interesting Extracts.

EXECUTION OF PIRATES.

A HORRIBLE FATE.

SICKENING DETAILS.

The execution of the Maha Raja pirates, which took place at Tongkah on Monday, the 20th ult., was, according to the *Penang Gazette*, a very gruesome affair. The sentence was read in a space in front of the palace. About 200 of the principal inhabitants, Siamese and Chinese, had assembled, and a large number of police—perhaps 50 Sikhs and 100 Siamese—surrounded the place. There were nine prisoners, two of whom were arrayed in white coats, which is the sign of condemnation to death, while the others were clothed only in sarongs. All of them were in heavy chains. The sentence, which with other documents took about twenty minutes to read, was that two of the prisoners should be beheaded; the other seven were each to receive ninety strokes with the rattan—sixty on the spot and thirty at Bangkok—and to be imprisoned for life. On the reading of the sentence it was discovered that the white coat had been put on one of the wrong men, and one of the seven, on hearing himself thus condemned to die, came out from the rest and prayed for his life, at the same time saying that one of the others deserved death more than he. It was in vain, and the white coat was transferred to the unfortunate supplicant. The flogging then commenced. Stands had been erected where four men could be flogged at once—curious erections, consisting of two posts placed about eighteen feet apart, with two parallel bamboos running from the foot of one to the top of the other, the culprit's head being fastened between them by two bars across. On sitting down a rope was fastened round each prisoner's waist, and tied to the post behind him; his arms and legs were then pulled out straight in front of him, his hands tied to the bamboos and his feet to the other post, the ropes being pulled so tight that his back was stretched like a drum. First four men were flogged. The rattans used in the operation were about 4ft. long, and as each stroke fell the men shrieked with agony, and their backs gradually rose into gory, swollen, shapeless mass. After administering thirty strokes the floggers stopped for a rest of about a minute, and then gave the remaining thirty; the three other men who had still to be flogged, and the two who were to be beheaded, looking on all the time. When the four had been flogged, the other three were treated to the same dreadful punishment, after which they were allowed to crawl in among the crowd. As they were all heavily ironed there was no chance of escaping.

On the flogging being over the police closed up and marched with the two condemned prisoners to the place of execution; a field picturesquely situated at the foot of a sugar-loaf shaped hill, where a space of about 250 yards in circumference had been roped off, round which a great crowd of people, principally Siamese and Chinese, had assembled. Inside this enclosure police were stationed all round at intervals of about three paces. At one part of it a shed had been erected for the Commissioner, and others. At another there was a small platform, on which were placed food and water for the prisoners; and there, after being sprinkled with water, large dishes of curry and rice were placed before them, of which they partook heartily. They then washed their feet, covered their heads, and prayed towards the setting sun. When they had finished, the executioners, after sprinkling themselves with water, proceeded to ask forgiveness of the prisoners for the deed about to be done, and on this being granted presented each prisoner with a flower. The executioners then partook of food. In the centre of the field two short stakes had been driven into the ground, and to these, when the executioners had finished their meal, the prisoners walked slowly out, without any one to guard them. On arriving at the stakes they again prayed; they sat down, with their backs towards the stakes, to which their arms were tied; after which an official walked out, blindfolded them with stripes of linen, filled their ears with clay, and then retired with his assistants, leaving the condemned men alone in the middle of the field. About two minutes after the executioners walked out armed with Japanese swords, and sat down some thirty paces beyond the prisoners. They sat thus for perhaps a minute; then they rose and advanced towards the doomed men, executing fantastic dance-like figures, almost as if cautiously approaching an enemy, till they came within striking distance, when they raised their swords as if to strike; but instead of doing so turned round and retired to where they started from. After a short pause they advanced again in the same manner, but on coming close, stooped down and looked fixedly for about ten seconds into the faces of the prisoners, who sat perfectly motionless, and then again retired. The third time they advanced, and, as in the first instance, raised their swords as if to strike, but instead of doing so they turned round and again retired. Then they knelt down, and bowing towards the Commissioner, called out in Siamese that they awaited his orders. On receiving the word they advanced towards the prisoners, more quickly than before, and when within reach, after standing for a few seconds with their swords poised in the air, proceeded to cut their heads off. The head of the man who had begged for his life was taken off at three blows; but seven or eight were struck before the head of the other—an immensely powerful-looking man, with a thick, muscular neck—fell. The moment the first man's head fell his executioner ran off to a temple close by to perform certain rites, the other executioner following as soon as his victim's head was off. The heads were thrown into kerosine tins along with arsenic, to be sent to Trang, where the piracy for which the men were executed took place. The bodies were then cut down, and a Chinaman with an axe knocked off the heels from the lifeless limbs, so as to permit of the irons, which were welded on, being removed.

◆

ANECDOTES OF ROTHSCHILD.

The following is translated from the *Reveu des de x Mondes* :—The prosperity of Nathan Rothschild awakened not a little animosity. The Bank of England became jealous of this mighty new financier with a credit equal to their own, and with whom it was necessary to reckon. Some have doubted the following story, but those who best knew the man had faith in its truth. It will give an idea of the connection between the two rivals. Believing itself to have cause to complain of the proceedings of Rothschild, the Bank of England refused in 1832 to cash a bill for a considerable sum, which his brother Anselm had directed to be paid him from Frankfort. He was informed that the bank only cashed their own paper, and not that of private firms. "Private firms!" cried Nathan. "Very well; I will show them the kind of private firm ours is." One morning, three weeks afterwards, he presented himself at the Bank of England, drew from his pocket-book a bank note for £5, and demanded payment. Surprised to recognise Rothschild, and to see the great banker trouble himself about so small a sum, a clerk handed him the five gold pieces. He examined them one by one very carefully, rang them on the marble, and placed them in a bag. Then, drawing out a second note, a third, a fourth, a tenth, a hundredth, he calmly and slowly stored away the gold as it was passed to him, not without testing each piece separately. His pocket-book empty and the bag full, he gave them to a follower, received a second pocket-book and a second bag, and continued this until the hour of closing. In seven hours he had been paid £21,000 sterling. But during this time nine of his employés had done the same at each of the nine other pay desks of the bank, continuing all day, to the great astonishment at first, then to the greater inconvenience of the public who were unable to approach. In one day alone £210,000 sterling was drawn on the reserves of the Bank of England. There was great amusement "On 'Change" when the eccentricity of Nathan became known. The directors of the bank related it themselves, shrugging their shoulders and ridiculing the futile efforts of their rival to embarrass this great public establishment by such a withdrawal of funds. But when on the morrow they learned that upon the opening of the bank Rothschild and his nine employés had recommenced their manœuvres of the day before they found the joke a little too prolonged. Surprise turned to alarm when one of them heard the financier tranquilly remark to his friends—"These gentlemen of the Bank of England refuse my paper; I do not want them, and in two months from now I will have finished to cash at their pay desks the notes I retain in my chests." Two months! That represented 11 million pounds sterling, the interruption of the services, perhaps a panic. The directors capitulated, and the next day gave notice that the Bank of England accepted as readily as its own the paper of the House of Rothschild. As Nathan was habituated to see round his table princes of the blood, peers of the realm, Ministers and ambassadors, he elsewhere held titles in little esteem. A German prince one day presented himself at Newcourt, the home of the rich banker. The prince was pompous, infatuated with his rank. Rothschild was brusque and absorbed, and the interview was as brief as characteristic. Shown into the room the prince found the banker writing before a great desk strewn with papers. A servant gave out the name and title of the visitor, whom Rothschild, saluting with a nod, invited to seat himself, and went on with his work. Not used to this kind of reception, the prince remained for a moment standing, and addressed himself to his host, "Do you know who I am, sir?" "They have told me. I shall be at your service in an instant; take a chair," said the busy Rothschild. "I am the Prince of X——." "All right. Take two chairs, then," replied the unmoved millionaire.

◆

BEES AND BEE-STINGS.

A correspondent, who has travelled in many lands, sends to the *St. James' Gazette* the following :—Not long ago you quoted Bishop Hannington's description of how he and his men were attacked and effectually routed by swarms of wild bees, who held and guarded a radius of about 300 yards, wherein lay scattered the loads which the terrified bearers had thrown down in their flight. While the bishop and his chaplain suffered severely, the unclothed natives were of course still more painfully assailed, and from the back of one man about 50 stings were extracted. To-day brings me a letter from the Central Provinces of India, relating how a very similar adventure befell a large picnic party from the hill station of Pachmahri, who sought refuge from the heat of the day in the pleasant shade of some caves. These, however, proved to be already tenanted by wild bees, who resented the intrusion, and attacked the unwelcome visitors with such determination that the whole party of forty persons was put to flight; the bees following them for a considerable distance. Finally, by scattering in every direction, each fugitive, being armed with green boughs with which to beat off the enemy, the latter were induced to return to their caves, but not till several ladies had fainted and some of the party had been very seriously stung. No fewer than twenty-nine stings were extracted from the face of one gentleman, while, strange to say, his companion escaped without one sting. About three years previously a doctor was so severely stung in this same locality that he died in consequence of the poison thus injected. Considering how many persons even in this country suffer seriously from even one sting, it is a hint worth recollecting that a warm bath containing a good handful of carbonate of soda effectually counteracts the poison of these tiny wounds ; and perhaps some of your readers (who will be maddened this autumn by the attacks of gnats, or of the tiny midges which rise in such myriads from the dry heather) may thank me for reminding them that a few drops of liquid ammonia or sal volatile in water are the most useful lotions for allaying the feverish irritation thus caused. Speaking of bees and stings, I know not what Sir John Lubbock says on this subject; but Mr. W. F. Clarke, a Canadian naturalist, tells us that the primary use of a bee's sting is not as an offensive weapon, but as a skilfully contrived little trowel for finishing off the full cell in the most artistic manner, capping the comb and injecting the formic acid which preserves the honey within the cell. Honey extracted before it is thus capped does not keep well, and this is attributed to the omission of this preserving acid. When these last touches are being added to the waxen covering, and while "the little pliant trowel is being worked to and fro with such dexterity, the darts, of which there are two, pierce the plastic cell surface, and leave beneath it tiny drops of the fluid, which makes the nectar keep well." Hence, says Mr. Clarke, "the sting and the poison bag, with which so many of us would like to dispense, are essential to the storage of the luscious product, and without them the beautiful comb-honey of commerce would be a thing unknown."

◆

RAILWAY v. OCEAN CHARGES.

A gentleman recently took half a ton of Kentish jams to India, and he has now written home to say that the carriage of the jams from London to Southampton, nearly eighty miles, was £1 8s., whereas all that was charged for conveying the same by steamer from Southampton to India, a distance of over 4,000 miles, was 17s.

Humorous.

A farmer residing in a small village near Pontefract had amassed, as he thought, £4,000. He, however, in order to be sure of this, took his books to be examined by a neighbour, who was considered rather good at figures, and was surprised the next day on receiving the balance sheet, showing his fortune to be £6,000. "It cannot be," said the farmer, "count again." The neighbour did count again, and again declared the balance to be £6,000. The farmer counted himself, and he also brought it up to £6,000. Time after time he cast up the columns, it was still a 6, and not a 4, that rewarded his labours. So the farmer, on the strength of his good fortune, refurnished his house, and had it thoroughly done up, and "put money in the purse" of the carpenter, the painter, and the upholsterer. Still, however, he had a lurking doubt of the existence of the extra two thousand pounds; so, one night, he sat down to give the columns "one count more." At the close of his task, he jumped up as though he had been galvanised, and rushed through the village, in a shower of rain, to the house of his neighbour, who had gone to bed. The neighbour's head, capped and drowsy, emerged from an attic window, at the sound of the knocker, to inquire the errand of his midnight visitor. "Who's there," he mumbled, "and what d'ye want?" "It's me, ye scoundrel!" exclaimed the farmer; "ye've added up the year of our Lord among the pounds!"

⁂

The American *Locomotive Engineer* tells the following :—A young fireman whose sole idea was to shovel on as much coal as possible at every possible opportunity, filled the firebox up solid so badly on one occasion that his train arrived several hours late for want of steam. The engineer had tried remonstrance in vain, and concluded that some other method than precept was necessary. "Mike," said he, "take that scoop into the blacksmith shop and tell the boss blacksmith to give her a good bit less lead." The engineer's face was as calm as a summer sea, and looked as if it might have been a masterpiece of Michael Angelo moulded in the best Spanish mahogany. Mike took the shovel into the blacksmith's shop and repeated his order. The boss Vulcan cut off about 4in. from the edge of the scoop. Mike carried it back and asked the engineer how it would suit. "All right," said the runner, "that was the trouble; she'll steam to-night." She did. Mike could not get more coal into the firebox than she would burn, work as hard as he would, and after a few trips he got weak enough to tumble to the fact that a little judgment mixed with the coal was a good thing for a fire, and that, when he knew how, it was easy work to keep an engine hot with a scoop having any amount of "lead," provided he did not work it in the corner all the time.

⁂

NOT AS HE SUPPOSED.

A case was being tried in the West of England, and at its termination the judge charged the jury, and they retired for consultation. Hour after hour passed and no verdict was brought in. The judge's dinner-hour arrived and he became hungry and impatient. Upon inquiry he learned that one obstinate juryman was holding out against eleven. That he could not stand, and he ordered the twelve men to be brought before him. He told them that in his charge to them he had so plainly stated the case and the law that the verdict ought to be unanimous, and the man who permitted his individual wisdom to weigh against the judgment of eleven men of wisdom was unfit and disqualified ever again to act in the capacity of juryman. At the end of this excited harangue a little squeaky voice came from one of the jury. He said: "Will your lordship allow me to say a word?" Permission being given he added, "May it please your lordship, I am the only man on your side!"

She: "I hear that you have lost your valuable little dog, Mr. Sissy?" He: "Yaas, in a railroad collision. I was saved, but the dawg was killed." She (shocked): "What a pity!"

◆

Slimley: "Here, waiter, these eggs don't seem to be very fresh!"

Waiter: "What would yez have? Sure, yez can't expect two fried eggs wid a certificate av birth for threepence."

◆

Nervous passenger (on American railway): "Conductor, why are we running at such a frightful rate of speed?"

Conductor (reassuringly): "There's a rotten bridge, madam, half a mile ahead, and we want to get over it with as little strain as possible."

◆

AN APT REPLY.

A country clergyman was boasting of having been educated at the two Universities. "You remind me," said an aged divine, "of an instance I know of a calf that was suckled by two cows." "What was the consequence?" said a third person. "Why, sir," replied the old gentleman very gravely, "the consequence was that he was a very great calf!"

◆

MILITARY AND HEROIC FUDGE.

"My brave fellow-soldiers,—We are now on the eve on encounteridg the enemy. See, there he stands in hostile array against you. He thinks to terrify you by his formidable appearance. But you regard him with a steady, a fearless eye. Soldiers! the world rings with the fame of your deeds. Your glory is imperishable; it will live for ever. Regardless of wounds and death, you have ever been foremost where honour was to be won. Recollect, then, your ancient fame, and let your deeds this day show that you are still the same brave men who have so often chased your enemies from the field; the same brave men who have ever looked on death as a thing unworthy a moment's consideration—on dishonour as the greatest of all evils. Band of heroes, advance! On, on to victory, death, wounds, glory, honour, and immortality!"

"Hurrah, hurrah! Field-marshal Fudge for ever!—lead us on, field-marshal, lead us on!"

"Lead ye on, my brave fellows? Would I that my duties would permit me that enviable honour! But it would be too much for one so unworthy. Alas! I dare not. My duties call me to another part of the field. I obey the call with reluctance. But my confidence in your courage, my brave fellows, enables me to trust you to advance yourselves. On, then, on, my band of heroes, and fear nothing!"

The field-marshal raises his hat gracefully, bows politely to his "band of heroes," and rides of to a height at a safe distance, from which he views the battle comfortably through his telescope.

◆

YOUTHS' AND MAIDENS' DREAMS.

A number of young people, desirous of knowing their future husbands or wives, recently decided to put wedding-cake under their pillows at night, and dreamed of the following:—1, of her grandmother; 2, of a snake swallowing a man; 3, of an elephant skipping a rope; 4, of a runaway team; 5, of a railroad accident; 6, of a murder; 7, of a fight between male cats. The following day they decided to abjure matrimony, among other vices, with the beginning of the new year.

◆

LIGHT FROM ABOVE.

In the days when nature and revelation were pitted againt each other, David Hume, the sceptic, wrote an essay on the sufficiency of the light of nature. Dr. Robertson, the historian, replied to it by an essay on the insufficiency of the light of nature and the necessity of revelation. The two gentlemen were friends, though antagonists. One evening at Robertson's house, where a literary party had assembled, nature and revelation was the topic of conversation.

Hume was present, and joined in the conversation, and urged his view with his usual subtilty: while Dr. Robertson set forth his faith in revelation with great clearness and power.

Hume rose to depart before the other guests, to whom he bowed as he retired through the door, followed by the host with a light to show him the way.

"Pray, don't trouble yourself," said Hume to his host; "I find *the light of nature always sufficient.*"

He walked on, along the hall, stumbled over something, pitched through the open front door down the steps and into the street. Dr. Robertson ran after him with the light, and, holding it over him and assisting him to rise, said quietly, "You had better have *a light from above*, Mr. Hume."—*Youth's Companion.*

◆

A SMART YOUTH.

The other day a grocer was hungrily waiting for his assistant to return from dinner and give him a chance at his own noonday meal, when a boy came into the shop with a basket in his hand and said:

"I seed a boy grab up this 'ere basket from the door and run, and I run after him and made him give it up."

"My lad, you are an honest boy."

"Yes, sir."

"And you look like a good boy."

"Yes, sir."

"And good boys should always be encouraged. In a box in the back room there are eight dozen eggs. You may take them home to your mother and keep the basket."

The grocer had been saving those eggs for days and weeks to reward someone.

In rewarding a good boy he also got eight dozen bad eggs carried out of the neighbourhood free of cost; and he chuckled a little chuckle as he walked homeward.

The afternoon waned, night came and went, and once more the grocer went to his dinner.

When he returned he was wearing a complacent smile.

His eye caught a basket of eight dozen eggs as he entered the store, and he queried:

"Been buying some eggs?"

"Yes, got hold of those from a farmer's boy," replied the assistant.

"A lame boy with a blue cap on?"

"Yes."

"Two front teeth out?"

"Yes."

The grocer sat down and examined the eggs.

The shells had been washed clean, but they were the same eggs the good boy had carried home the day before.

◆

NOT ACQUAINTED.

Talking about railway-men who leave their homes early and get back after dark, and never see their children, a man of that sort was hurrying away one morning when he found that his little boy had got up before him and was playing on the street. He told the child to go in. Child wouldn't. Man spanked him and went to work. Child went in howling. The mother said, "what's the matter?" "Man hit me," blubbered the youngster. "What man?" "That man that stays here Sundays."

◆

THE OLD 'BUS HORSE.

Mr. Macready Kemble Barnstormer (appearing with great success as Dick Turpin at the T. R. Welney Walsh): "Now, laddie, when you hear Tom King say, 'See! here comes Dick on his bonny black mare, galloping like the whirlwind!' you slam that door hard, and holler out, 'Full inside!' She won't start without."

Poetry.

THE FREE-FOR-ALL RACE.

BY W. D. ROBINSON, S.R.

"For the Angel of Death spreads his wings on the blast,
And breathed in the face of the foe as he passed."
Byron.

'Twas the "Every-Day Club" at its every-day meet,
  And the day wore an every-day look;
The riders seemed eager, while their studs looked so fleet,
The course all in order, the entries complete
  As marked in the manager's book;
And the breast of each one with emotion did swell,
As the cheers of the multitude rose and fell.

A voice was soon heard, as it were far away,
  Yet clear as a trumpet's loud call;
"Take heed to my warning, make haste, clear the way,
Now comes the last race on our programme to-day,
  'Tis the regular free-for-all,
When the signal you hear, the twang of a bow,
Let each one be mounted, and ready, and *go.*"

The first to present was a sturdy brave youth,
  With a smile on his bright comely face;
He called his steed "Love," and thought, of a truth,
A winner he surely must be, as, forsooth,
  "Could another steed show such a pace?"
And he bowed to the judge with an air which would say,
"In this great free-for-all I'm the victor to-day."

So, in turn, came a hero of forty odd years,
  Of firm and contemplative air;
His stead was named "Courage" and he had no fears
He should e'er be the object of scoffs or of jeers,
  So long as they dealt with him fair;
"For old courage would win as he always had won,
And he'd show them 'twas true, when this last race was done."

The next was a veteran of three-score and ten,
  With hands all unsteady and thin;
Borne onward by "Hope" he oft and again
Had fairly outridden much stronger young men,
  And surely once more he must win.
Hope to him was the same as at manhood's first dawn,
As strong as the lion, and fleet as the fawn.

Thus on through the entries (there was fully a score),
  And each was so sure of success,
They hugged to their bosoms the day dreams of yore,
And builded their castles as high as before,
  With no thought of defeat or distress.
So expectancy's cup with its long promised draught
Is oft pressed to the lip, yet how seldom 'tis quaffed.

Now a horseman whose steed showed an indolent pace,
  Rode carelessly up to the stand;
"I am here to contest in this free-for-all race,
Have the goodness at once to assign me a place,
  I belong to the every-day band."
And his vizor was raised, as he ceased thus to speak,
O'er a lustreless eyes, and a colorless cheek.

"Your name and your steed?" My charger is Time,
  No matter how mortals name me;
All that's known is oft told in a funeral chime,
A problem unsolved, a mystery sublime,
  And a secret I ever shall be.
But haste, give the signal, let's up and away,
Ere the shadows of night take the place of the day."

"Yet list for one moment," he raised his mailed hand,
  "To-day I am champion here;
Proclaim it aloud through all the wide land;
Myself and my steed pray who can withstand?"

And he bowed as a brave cavalier.
" 'Tis an every-day deed I am doing alway,
Love, Courage, and Hope must be vanquished to-day."
And his lip wore a merciless sneer.

The derisive loud cheers for the horseman so pale,
And his steed with the noiseless tread,
Which were borne afar on the evening gale,
Were soon to be changed for the pitiful wail
Of a helpless grief for the dead.
Even now the dark shadow was over their path,
And the icy breath of the spoiler's wrath,
Was tinging their laughter with dread.

* * * * *

The signal was given, the field was away,
The struggle was furious and fast;
The struggle of life and of every day,
For out of this race no mortal can stay,
And Death conquers all at the last.
So the tumult of life and the funeral pall,
With the "Every-Day Club" and its great free for-all
In this likeness familiar is cast.

DRIFTED APART.

(A JUDICIAL SEPARATION.)

And so you do not love me, John, as once you did, you know;
You seem to have forgotten all the old sweet long ago;
The gentle word, the fond caress, the tender loving ways
Are buried now for ever in the dead—the bygone days;
We never had an angry word, no storm clouds in our life,
Before kind friends with venomed tongues stepped in 'twixt man and wife.
We've had together ups and downs, we've breasted many a tide,
Since I was then (you called me so) your winsome, bonny bride;
And our first grief—have you forgot—when Willy went away,
I think I see your sorrow then, I think I hear you pray;
Ah! lad, men call us women fools; well, well, then, Heaven defend
Us women, for we're mostly fools in that way to the end.
I'm living o'er the happy past, before this pain arose,
So call me what you will, I am a poor weak fool, God knows.
Forgive me, John—remember it's a cruel word, "Good-bye,"
We're parting now *for ever*, and you know the reason why;
You think I've not been faithful, that my words have not been true,
Through all these twenty years I've been a loyal wife to you;
Our tempers have gone crossways, we've made each other smart,
And bitter words we've uttered now have severed us apart;
And then our friends and neighbours added each their little mite
(They saw the fire was kindling and they wished to set it light);
We might have been *so* happy if we'd only tried *to bear*,
Each kept a stock of patience, and each given in our share.
We *see* when things are over, oh hard, unpitying fate,
The mocking words ring o'er me, too late—alas, too late.
I see you're growing weary, I know your love is gone,
Just bear a few brief moments, you'll soon be left alone.
I—only want to ask you—if when I come to die,
You'll put me in the churchyard, where Ben and Janey lie,
My babies who are sleeping so peacefully at rest,
You'll lay me down beside them,—'tis all my last request.
And now "Good-bye,"—my husband—may all your after life
Run calm and smoothly onward—we've had enough of strife.
And when we meet up yonder, our faults will be forgiven,
For earthly things are righted—we shall be one in Heaven.

Correspondence.

NOTICE TO CORRESPONDENTS.

We do not hold ourselves responsible for the opinions expressed by Correspondents.

We reserve to ourselves the right to publish or reject any correspondence

Rejected correspondence will not be returned unless accompanied by a stamped envelope.

All correspondence to be written on one side of the paper only.

We shall be glad to receive articles of interest and information on Railway Work, Machinery, &c. (English or Foreign), interesting Stories of Railway experiences, information of accidents, or any subject of general interest.

All correspondence to be addressed to Mr. T. G. Sunter, General Secretary, 17, Mill Hill Chambers, Leeds.

To the Editor of the Associated Society of Locomotive Engineers and Firemen's Journal.

YORK BRANCH.

August 14th, 1888.

Dear Sir,—In my last report, which appeared in our April Journal, I stated that our branch had made steady progress since its formation. It is now my pleasing duty to state for your information, and for that of our brethren who are far, far away, but who take an interest in the welfare of the Society, that we have of late, like the Flying Scotchman, increased our rate of progress, as I think, Sir, you will admit when I inform you that in April we had 42 members' names on the books, as against 56 at the present time, being an increase of 14. I am happy to know that our men, especially the firemen, are beginning to awaken to their own interests, and to embrace the advantages held out to them by our Society, and well they may, after certain proposals made at a certain delegate meeting, held at Darlington a short time ago, which proposals certainly would place firemen in a worse position than at the present time if carried out, and that, Sir, is needless, as I consider there is no class of men who have to work so hard, and endure such hardships as locomotive firemen, I speak from 14 years experience of firing, and I have no hesitation in saying that no class of railway men are less thought of than firemen have been in the past. I am happy to notice a great change in this respect, and surely this is in some degree attributable to the influences of our Society, in recognising the fact that "A man's a man for a' that," and that all men are brethren.

Believe me to remain,
Yours truly,
S. Roe, Sec.

THE RAILWAY RACE TO EDINBURGH.

Sir,—The very complete accounts which have appeared in your columns with reference to the railway racing, have been read with the greatest interest, indeed I may almost say excitement; but when the whole of the facts are carefully considered it must be with feelings of satisfaction and relief that the announcement is made that the racing is to end with the month of August.

Previously to the commencement of the present race, the time occupied in running between London and Scotland was too long, and there was necessity for some acceleration. The reduction in the time from ten hours to nine, and from nine to eight and a half hours was perfectly reasonable, and was performed without undue speed, and if the race had then ended the public would have been perfectly satisfied.

Unfortunately, the time was further reduced to eight hours, then to 7¾ hours, and the trains then ran before time and, as recorded in your journal, peformed the the journey in 7 hours 32 minutes. It is a well-known fact to railway men that the trains are, as a rule, booked to run up the gradients at a pace which taxes the locomotives to the utmost. Practically, therefore, little or no time can be gained when travelling up hill, and very little when running upon the level. Consequently it follows that excessive increases of speed must be made when going down gradients, and from the details of speed which have been published and from my own notes, it is clear that in this race trains are run down hill, round curves, and over junctions at

73, 74, and 75 miles an hour.

Your readers are aware that the speed of the trains is ordered to be reduced over certain portions of the line, but as a matter of fact, in this race these instructions have to be to a serious extent disregarded to save time.

Another important matter is the running of trains before time. Every signalman knows the exact time when the express should pass his box, and he works accordingly ; but how can a man arrange for trains which run 10 or 15 minutes before the booked time ? In practice, to avoid delay to the race trains, signalmen have to begin to shunt other trains off the main line some half-hour before the express be due. If the delay and loss of time to other trains be taken into consideration, the absurdity of running before time is made clear. There is no doubt that for fast traffic long runs must be made, but it is most important that the engines should either be provided with an arrangement of pipes by which oil can be conveyed from the footplate, or that the oil-cups should be made sufficiently large. It is, in the first place, not right to require an engine driver to go along the frame of the engine to oil when running at full speed, neither is it safe for a train of passengers to be running with the driver away from the footplate and completely out of reach of the regulator and continuous brake.

Several of your correspondents have pointed out in your columns recently that the speed run on railways now is no higher than it was 40 years ago. They are perfectly correct.

Forty years ago the battle of the gauges was being fought, and, practically, the the limit of locomotive speed was then attained. In 1853, one of the Bristol and Exeter engines, with a 9 feet wheel, reached a speed of 80 miles an an hour, which has never since been equalled, and certainly is not likely to be surpassed.

The character of the traffic is altogether changed. In place of the few express trains which conveyed only first-class passengers, the engines are now required to draw long, heavy trains of third-class passengers. Consequently in these days it is more a question of power and high speed than of excessive speed with a light load.

The third-class traffic pays far the best, and, therefore, it is third-class which should be carefully looked after and encouraged.

Yours truly,

Clement E. Stretton, Consulting Engineer, Associated Society of Engine-drivers and Firemen.

40, Saxe Coburg-street, Leicester, Aug. 21.

* * *

BLACKBURN BRANCH.

Sept. 3rd., 1888.

Dear Sir,—At our last monthly meeting a few words were addressed to the members by those who had travelled a distance of 27 miles from here to hear Messrs. Stretton and Ball at the Openshaw Branch meeting, and all were highly pleased to hear the eloquent addresses delivered by those gentlemen, whom we are proud to have connected with us, and also to hear of the progress of the Society. The history of 20 years ago is fast repeating itself, when the loco. men throughout the kingdom joined hands for their own common interests, and which they manfully achieved.

It is by sectional efforts only that the locomotive men have made any advancement towards their welfare, and it was manifest by the numerous assembly at the Openshaw meeting of loco. men from different lines in the district, that progress is being made in that direction, and much good will accrue.

For a long time, we here, in the interests of other Societies were prejudicially opposed to the Associated, but circumstances have necessitated its adoption, and whilst men are anxiously asking for a national conference of locomotive men, we believe it is the Associated Society only that can bring about a consummation of their desires ; we earnestly ask them to "come over and help us."

A special meeting was held a fortnight ago, to consider the movement for an

Orphan Fund, and after a very interesting discussion, it was resolved to forward the following suggestions to the Executive Council.

That believing beneficial results would accrue from the establishment of an Orphan Fund in connection with the Society, drivers should pay a sum of 5s. and firemen at least 2s. 6d. to form the nucleus of a fund to commence with, and that it afterwards be maintained by weekly contributions, and that it be left optional for members to join.

It is also suggested that in the meantime, should any of our members be suddenly cut off by death or accident, leaving a wife and family of little ones, an appeal should be made to the members of the Society for a small voluntary subscription on their behalf.

The Journal here is highly appreciated and the Branch making progress.

Yours respectfully,

Lord Arran.

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MEMBERS' RESPONSIBILITIES.

We fear that it is too much the habit of our members to let the responsibilites of the Society rest upon a few men ; if these few men are at their post, well and good, but in their absence everything goes wrong. Every man in the Society ought to feel its great responsibilities ; don't depend on one or two men ; if your leaders are sick, or absent, don't let the meeting lose interest and force. There are other men in our branches just as good, and just as competent as the leaders. Learn the fact that our organization does not depend upon a few men, it depends upon our principles. Every member should learn to do his duty independent of others. The success of our efforts does not depend upon a few officers ; the officers are very well in their places, but if they die or resign, others can perform their duties. It would be a sad thing if our grand Society depended on a few men. Our Society is founded upon principles, and its life depends upon no man's life, it will flourish when all our present members are dead. The Society founded upon the good sense of all its members will live for ever.

C.B.

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REPLIES TO QUERIES.

No. 2, July issue. Supposing an engine to be running ahead, and the necessity arises for stopping suddenly, and the reversing lever is pulled into the back notch when the crank pin is on the centre, and, therefore, the piston at the forward end of the cylinder, about to begin its backward stroke, the valve has the forward port open a distance equal to the amount of lead, but as the back up eccentric has control of the valve, the latter is being pushed forward, and it closes the forward port just as the piston begins to move back. This shuts off all communication with the forward end of the cylinder, and the receding piston creates a vacuum behind it, just as a pump plunger does under similar circumstances. At this time the back end of the cylinder is open to the exhaust, and the piston pushes out the air freely to the atmosphere. By the time the piston travels about two inches, the valve gets to its middle position, and immediately after passing that point, it opens the forward end of the cylinder to the exhaust, and closes the back port. When this event happens, the vacuum in the forward end of the cylinder gets filled with hot gases that rush in from the smoke box, and the receding piston keeps drawing air into the cylinder in this way during the remainder of the stroke, and the air from that quarter seldom gets in without bringing a sprinkling of cinders. The back steam port is closed only during about two inches of the stroke, while the lap of the valve is travelling over it. About the time the piston reaches four inches of its travel, the back steam port is open to the steam chest, and the piston forces the air through the steam pipes into the boiler during the remainder of the stroke. The forward stroke is merely a repetition of the backward stroke described. When it is necessary to reverse a locomotive, it is a better plan to hook the lever clear back than to have it a notch or two past the centre, as some men persist in doing, under the mistaken belief that they are in some way saving their engine from harsh usage. When the link is reversed full, the cylinders are merely turned into air pumps. When the links are put near the centre, the travel of the valve is reduced, and the periods when the piston is creating a vacuum in one end of the cylinder, and compressing the air in the other, are prolonged. The result is that, when the exhaust is opened in the first case, the gases rush in violently from the smoke box, carrying a heavy load of cinders; in the other case, the piston compresses the air in the cylinder so high that it jerks the valve away from its seat in trying to find outlet. This causes the clattering noise in the steam chest, so well known in cases where engines are run without steam while the reversing lever is near the centre.

Angus Sinclair.

2, August issue. If the muscles, nerves, &c., of the human body waste away like a burning candle, why is not the body consumed in a short interval? Because the blood (or the life), regulated by the nervous system, supplies the body with new matter. If there be a fractured thigh or a scalp wound, the blood supplies what is necessary to knit the one and heal the other, in fact there is supply according to the demand. Thus, while muscles, nerves, skin on the hands, hair on the head, &c., waste away, the body is not consumed because of this supply of new matter, while in the case of the burning candle there is consumption and no supply.

3. Yes; it may happen in the case of the apparently drowned by restoring circulation before natural breathing, because the carbonic acid gas would not be given off, neither would the oxygen be taken in, so that the blood would return from the lungs to the left auricle of the heart without being purified. This may also happen in an over-crowded room, after all the oxygen has been consumed, the carbonic acid would then be breathed again; in this case, fainting oftens occurs, in the former, it may cause suffocation.

Yours truly, T. R.,
Pontypool Road.

Sir,—In reply to query No. 4 of August issue, I would advise your correspondent D.D. to follow the instructions given by Mr. M. Reynolds, in supporting an engine by wooden blocks, in case of a driving spring or hanger breaking. And I must say I am surprised that your correspondent should question its correctness, unless he has proof to the contrary. A greater reflection could not be cast upon an authority of such high standing as Mr. M. Reynolds, who has done so much to elevate and improve the status of enginemen generally, than to discredit or question the correctness of his statement without proof to the contrary.

In reply to query No. 6 of August issue. The lap and lead of slide valves and its advantages, is a question that can be but briefly dealt with in a letter to our *Journal*, with such a limited space. The question must be divided into three parts: first, outside lap and outside lead; second, inside lap and inside lead; third, its advantages. By outside lap is meant the amount by which the valve overlaps the steam ports when standing on the centre of valve seat. By outside lead is meant the amount of opening of steam port to admit the steam into the cylinder before the completion of the stroke of the piston, which is governed by the adjustment of the eccentric sheave upon the axle, and is rather complex to explain in a short letter of this description, but I will try to make it as clear as possible. If the valve was without either lap or lead, the eccentric sheave should be placed exactly one-fourth of a revolution in advance of the cranks; but if it had $\frac{7}{8}$ of an inch lap, and $\frac{1}{8}$ of an inch lead, the eccentric sheave should be moved one inch ahead of that position to withdraw the $\frac{7}{8}$ of an inch lap, to uncover the steam port, and also allow $\frac{1}{8}$ of an inch of opening to admit steam to the cylinder in front of the advancing piston, which constitutes the lead. Second, inside lap is the amount that the inner edge of the valve overlaps the edge of the exhaust passage, thereby delaying the release of steam from the cylinder. By inside lead is meant the amount that the inner edge of the valve falls short of conforming to the edge of the exhaust passage, thereby giving an earlier release to the steam. Third, the advantages of allowing outside lap, with increased boiler pressure, has wrought wonders in the economical use of steam, and consequently the use of fuel, by cutting off the steam earlier in the stroke, thereby reducing the period of admission, and increasing the degree of expansion. The advantage of outside lead is to ensure the initial pressure to aproximate as near as possible to boiler pressure, and at the same time form an elastic cushion to receive the advancing piston, thus modifying the shocks attendant with the reciprocating parts of the machinery. With inside lap probably no advantage is gained, except with engines of very slow piston speed, and perhaps not then, as it delays the release of steam, possibly at the expense of excessive back pressure. Inside lead undoubtedly is a great advantage with engines running at high speeds, as it facilitates the escape of exhaust steam, by simply allowing more time for that purpose, and at no part of the stroke is time more important than in the exhaust.

Yours truly, CATHAYS.

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On reading our much valued *Journal*, I saw a question asked in queries, by J. W. Does it ever happen that the venous blood is returned into the left side of the heart? From what I have been taught as a member of the St. John's Ambulance Association, I know no other way that venous blood returns to the heart, except when a person is apparently dead from hanging, drowning, or suffocation by gas, thus causing circulation before natural breathing has recommenced sufficiently to purify the blood; it would then return venous blood into the left side of the heart. As I have taken a delight in this and other similar questions since I became a member of the above Association, I should like to see some more able pen than mine take an interest in this most useful work.

Yours truly,
SUBCLAVIAN.

Society News.

SWANSEA BRANCH,
August 20*th*, 1888.

SIR,—I am glad to say that I am enabled to report an increase of two new members at our last branch meeting,

And remain, yours fraternally,
J. JAMES.

STRATFORD.

SIR,—I have pleasure in again being enabled to report an increase in our branch, three new members having joined last club night.

Yours truly,
W. STEWART.

LEEDS BRANCH,
August 20*th*, 1888.

SIR,—We held a special meeting on August 19th, and, after the business which called the members together had been discussed, three new members were admitted.

I am, yours truly,
J. C., Sec.

BRADFORD BRANCH,
September, 1888.

SIR,—Our last meeting was well attended and a good amount taken in contributions. I was expecting a goodly number who had promised to join turning up to fulfil their promises, but all of them did not do so. However, we enrolled two new members, and hope to shortly be able to record the others.

Yours fraternally,
T. ALLAT.

GRIMSBY BRANCH,
August 20*th*, 1888.

SIR,—We had a remarkably good meeting on Sunday the 19th, and an especial feature of the meeting was the great demand for the Society's emblem, which has given every satisfaction here, and, my previous supply having become exhausted, will you kindly send me another supply at your earliest convenience, and oblige,

Yours truly,
J. C., Sec.

SANDHILLS BRANCH.

SIR,—I am enabled to report an increase in our branch, three new members having been accepted last club night.

I am, yours truly,
J. B. BENNETT.

TONDU BRANCH.

SIR,—I am pleased to inform you we are going on well here; five new members joined us last club night.

Yours truly,
T. C.

OPENING OF A NEW BRANCH AT CHESTER.

SIR,—A meeting of Enginemen and Firemen was held at the Ermine Hotel, Chester, on Sunday, August 26th, 1888, under the auspices of the A.S.L.E. & F., to hear an address by Mr. T. Ball, the organizing secretary of the Society. The room was nicely filled, a number of those present hailing from the Birkenhead branch, including Messrs. Curran, Griffiths, Jones, Davies and Harvey. Mr. F. Curran, presiding, in his opening remarks, made an earnest appeal to those present to that night identify themselves with a Society which had so many claims upon enginemen and firemen, and then called upon Mr. Ball to address the meeting, who in response gave a very lucid and interesting address of about fifty minutes duration, on the objects and benefits of the Society, and the work it had been enabled to accomplish. He also expressed the wish that Chester would that night be added to their list of branches, which would make the eighth that had been opened this year, feeling sure that those present who gave in their names that night would never have cause to regret having taken such a step, as by so doing they would not only be making provision for themselves but would be conferring a boon upon the enginemen and firemen at Chester, by assisting to form a branch of a Society of which any of their mates might be proud, seeing that it was calculated to meet their every requirement, and which he felt sure, speaking from his own experience when an engine-driver upon the Midland Railway, would have a tendency to create a better feeling amongst themselves than had ever yet existed, for he was convinced that ill-feeling and petty jealousies had been one of the greatest bars to their social progress as a class. He had been told that he would have some difficulty in opening a branch at Chester, but he was sanguine as to the result of his visit, feeling certain that the objects and benefits of the Society had only to be made known to be appreciated. At the close of his address, which had been listened to with evident interest throughout, and frequently applauded, a branch of eighteen members was duly opened, including one honorary member. Mr. T. Preston was elected secretary, and the Ermine Hotel decided upon for conducting the affairs of the branch. Votes of thanks having been given the Organizing Secretary and visitors, the meeting was brought to a close.

I remain, yours truly,
T. PRESTON, Branch Sec.

KING'S CROSS BRANCH,
London, *September 3rd*, 1888.

SIR,—A mass meeting of enginemen and firemen was held at the City of London Hotel, York-road, London, on September 2nd, to hear addresses from Mr. Clement E. Stretton, C.E., and consulting engineer to the Society, and Mr. T. Ball, the organizing secretary. There was also present Mr. A. Tippetts, of the firm of Messrs. Tippetts and Son, solicitors to the Society in London, and a representative of the *Railway Herald*. The meeting, which was a large one, was composed of enginemen and firemen working upon the following railways:—Great Northern, Great Eastern, London and North Western, London and South Western, London, Chatham and Dover, London, Brighton and South Coast, Great Western, Midland, and North London. Mr. Stretton having been requested to take the chair, delivered a most interesting lecture upon "Railways and Railway Working," dealing especially with the recent racing of trains to Edinburgh, the system of eyesight testing, certificates for enginemen, hours of duty, and deprecated the system of oiling engines whilst running. He also made use of a number of diagrams during the course of his lecture, one of them, a plan of the Hexthorpe accident, being of great interest, many of those present being acquainted with the scene of the disaster. Mr. Stretton was listened to with keen interest throughout, and was frequently applauded, and I must be content with simply giving you the lines of his very able lecture, which lasted over forty minutes, and was highly appreciated by all present. The Chairman then called on Mr. Ball, who gave a very able and interesting address on the objects and benefits of the Society, and the rapid progress it was making, also giving a brief history of Trades' Unions, giving it as his opinion that however distasteful they might be to some persons, that they had been forced upon the working classes by the capitalists, and were the outcome of tyranny and oppression. He also shewed the beneficial results accruing from properly managed unions, and contrasted the position of enginemen and firemen with other classes of workmen, and said that for years they had been at a comparative standstill. He also denied the allegation that the founders of the Society were actuated by a desire to foster disputes between the masters and their workmen, referring his hearers to the Society's book of rules, wherein it would be found that the greatest precautions had been taken to prevent strikes, and that the sole aim of the pioneers of the Society was to furnish a means of protecting enginemen and firemen in their calling, and not with a desire to one day be in a position to bid their masters an insulting defiance; at the same time claiming that they were entitled to ask for just and honourable concessions at the hands of their employers. He also contradicted several statements that had been made in reference to the part the Society had played in the Hexthorpe trial, and said that he should not have alluded to the subject in the manner he did, but for the unwarrantable assertions that had been made against them, and challenged those present to accuse him of having said a word against any kindred Society on previous occasions, but that he was justified in the stand he took, seeing that people would naturally think they had left Taylor and Davis to their fate in the time of their misfortune although members of their Society, and it was his duty not to allow the statements to pass unchallenged, but gave it as his opinion that there was ample scope for both Societies to exercise their energies amongst the various grades of the railway service, without any show of animosity on either hand, and that he was more convinced day by day of the necessity of a separate organisation, and that their rapidly increasing membership was a proof that the English enginemen and firemen were beginning to think so too, like the enginemen and firemen of those two great continents, America and Australia, and urged upon the non-members present to join the Society, so that they might have the satisfaction of knowing they had done their best to better the condition of their fellow-labourers, for, to his mind, there was nothing so despicable as a selfish man who lived for himself alone, but who shared in the fruits of the labours of others. Mr. Ball then resumed his seat amid cheers, his interesting address having lasted an hour and five minutes. A member of the Stratford branch also spoke. Resolutions were then unanimously carried as follows:—Approving of the objects and benefits of the Society, protesting against the racing of trains, against the long hours of duty, in favour of a uniform code of signal lights for all railways, in favour of automatic continu brakes, expressing satisfaction at appointment of Mr. Stretton to the position of consulting engineer, and the introduction of the *Railway Herald* as an impartial and useful paper, to which the representative who was present responded. The names of a number of enginemen and firemen were then read over for membership, and will be duly enrolled at our next meeting. Votes of thanks to Mr. Stretton and Mr. Ball having been given and suitably responded to, a most enjoyable and profitable meeting was brought to a close.

I am, yours fraternally,
F. GREEN, Branch Sec.

MEETING OF ENGINE-DRIVERS AND FIREMEN AT BIRMINGHAM.

A meeting of engine-drivers and firemen engaged on the railways running to Birmingham, was held in that town, under the auspices of the Associated Society of Enginemen and Firemen at the Loxton-street Board School, on the 26th August. Mr. Clement E. Stretton, the Society's Consulting Engineer, occupied the chair. He delivered an interesting address upon the various matters relating to the safe working of railways.

Speaking of the railway race to Edinburgh, Mr. Stretton said that the very complete accounts which had appeared in the columns of the *Railway Herald*, the *Times*, &c., had been read with the greatest interest; and, in fact, he would almost say with excitement. When, however, the whole of the facts are calmly and carefully considered, it would be with feelings of satisfaction and relief that the announcement had been made that the racing was to end with the month of August.

Previously to the London and North-Western Company commencing the present race, the time occupied in running between London and Scotland by all three routes was too long, and there was a necessity for some considerable but reasonable acceleration. The reduction in the time from ten hours to nine, and from nine to eight-and-a-half hours was perfectly reasonable, and was performed without undue speed, and if the race had then ended the public would have been perfectly satisfied. Unfortunately, the time was further reduced to eight hours, and the East Coast then came down to seven-and-three-quarter hours, but the trains even then were "raced" on both routes in less than the booked time, and the journey was accomplished by the East Coast on one occasion in only seven hours thirty-two minutes. It was a well-known fact to engine-drivers and firemen that as a general rule trains are booked in the working time-table to run up the gradients at a pace which taxes the locomotive to the utmost.

Practically, therefore, very little, if any, time can be gained when travelling up-hill, and very little indeed when running upon the level. Consequently, it follows that excessive increases of speed must be made when going down gradients, and from the details of speed which have been published, and from his own notes, it was clear that in this "race" trains had been and were run down hill, round curves, and over junctions, at seventy-three, seventy-four, and seventy-five miles an hour. Practical men are aware that the speeds of trains are ordered to be reduced to the limit given in the "speed orders" over certain portions of the line, but as a matter of fact, in order to save time in the "racing" these orders have had to be disregarded to a very serious extent. Another important matter is the running of trains "before time." Every signal-man on the road knows the exact time when the express should pass his box, and he works the traffic accordingly. But, I ask, how can a man arrange for trains which run ten, fifteen, and even twenty minutes before the booked time?

In practice, to avoid delay to the "race trains," signalmen have to begin to shunt other trains off the main line some half-hour before the express be due. If the delay and unnecessary loss of time to other trains be taken into consideration, the absurdity of running before time is made clear. For fast traffic, there is no doubt that long runs must be made without stopping, but it is most important that the engines should either be provided with an arrangement of pipes, by which oil can be conveyed from the foot-plate, or that the oil-cups should be made sufficiently large to hold an ample supply of oil In his opinion, it was not right or fair to expect or require a driver to go along the frame of the engine to oil, when running at full speed, neither was it safe for a passengers' train to be running with the driver away from the foot-plate, and completely out of reach of the regulator and continuous brake handle. Several correspondents, writing to the daily papers, appear to think that the present rate is the greatest speed ever run, but the old enginemen know well that the speed of to-day is no higher than it was 40 years ago. The battle of the gauges, forty years back, was a far greater fight than the present "race," and practically the limit of railway speed was then attained.

In 1853, one of the Bristol and Exeter engines, having a 9ft. driving-wheel, reached a speed (when officially timed) of 80 miles an hour, which had never since been equalled. With regard to the run to Edinburgh in eight hours, it was interesting to find that it was proposed to run from King's Cross to Edinburgh in that time, as long ago as in 1853, in which year the Great Northern Railway Company had a high speed experimental engine constructed, having a driving-wheel 7 feet 6 inches diameter, and a large tender, capable of running from London to Grantham without taking water.

From a shareholder's point of view, Mr. Stretton was convinced that it would not pay to race to Edinburgh in less than eight hours and a half, for in order to run at excessive speeds the trains had to be divided. In place of one train and one engine, they now saw the same total number of carriages, but conveyed in two trains, of course with an engine each ; and further, the increase of speed requires the consumption of more coal. In short, to perform the work at the racing-pace required two engines in place of one, and the consumption of more than double the quantity of coal.

Mr. T. G. Sunter, the General Secretary of the Society, in a very able address, dealt at great length with the objects of the Society ; the work which had been done in the past and what they desired to attain in the future. He pointed out the advantages of engine-drivers and firemen being united in a Society composed entirely of men in their own grade in the service. The system of departments under which railways were worked tended to create differences of opinion between the various grades. To attempt to work to the best interests of every grade in any one Society was a very difficult matter, and even in Australia, from information just to hand, he found that a Society for drivers and firemen only had been found necessary. With every respect to the men in the other grades, and with every wish for their success in their own departments, he submitted that no one knew so well as engine-drivers and firemen what was most necessary to their own interests. He therefore urged those locomotive men present to join and become members of a locomotive society.

The following resolutions were then moved by various speakers and carried.

(1). "That this special meeting having heard the objects and benefits of the Society, pledges itself to support the same, and calls on those non-members present to join its ranks for their mutual benefit."

(2). Resolved—"That this meeting strongly protests against the 'racing' of trains, and especially against the running of trains before the booked time."

(3). Resolved—"That long hours of duty are a great cause of accidents, and that this meeting urges the companies to reduce the time on duty at any one stretch to ten hours, or as near to that limit as possible."

(4). Resolved—"That a vote of thanks be given to Mr. Sunter, General Secretary, for his attendance and able address."

(5). Resolved—"That this meeting views with the utmost satisfaction the appointment of Mr. Clement E. Stretton, C.E., to the position of Consulting

Engineer to the Society, and heartily thanks him for his services in the chair, and for his lecture."

After the conclusion of the above meeting, the Birmingham Branch of the Society held a meeting at the "Small Heath Tavern," Birmingham. There was a large attendance to hear addresses from Mr. Sunter and Mr. Stretton. Speaking of the Hampton Wick accident, Mr. Stretton referred to the very kind offer which had been made by the proprietors of the *Railway Herald* to give a sum of £25 towards a defence fund.

He considered the *Herald* had been a great boon to railway servants, both by providing them with a good, impartial, and independent penny railway paper, which previously did not exist, and also by the Free Insurance of £25.

It was proposed, seconded, and resolved—"That this meeting of enginemen and firemen views with great satisfaction the introduction of the *Railway Herald* as an impartial and useful railway paper; that it considers the insurance of £25 a great boon to railway servants, and wishes the paper every success."

Votes of thanks brought the proceedings to a close. We believe that the results of these meetings will be the means of a large addition of members to our Society.

M H. H. L.

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BRANCH MEETING HOUSES.

Sheffield.
Albion Inn, Johnson Street, Wicker. Alternate Sundays.

Pontypool.
Hanbury Hotel, Griffiths Town, Newport, Mon.

Neath.
Three Cranes Inn, Wind Street, Neath. Alternate Sundays, at 7.30 p.m.

Leeds.
Prince of Wales Hotel, Mill Hill. Last Monday in month, at 11.0 a.m.

Liverpool.
American Tavern, Byrles Street, Toxteth Park. Held fortnightly.

Bradford.
Granby Hotel, Union Street, Bradford. First Sunday in month.

Llanelly.
Neptune Hotel, New Dock, Llanelly.

Sandhills.
Brown Cow, Walton-on-the-Hill. Alternate Sundays.

Swansea.
Monthly—Landore Coffee Tavern. Saturday, at 8.30 p.m.
Quarterly—Oram's Coffee Tavern, Wind Street, Swansea.

Nottingham.
Mission Room, Queen's Walk, Nottingham. Every Monday at 8 p.m.

Bristol.
Phœnix Hotel, Totterdown. Every fourth Sunday at 7 p.m.

Plymouth.
At Mr. Sleeman's, 31, Harwell Street. Last Sunday in Quarter at 6.30 p.m.

York.
Adelphi Hotel, Railway Street, York. Alternate Sundays at 8 p.m.

Paddington.
Builders' Arms, Westbourne Park, London. Every third Sunday.

Newport.
New Bridge Inn, Bridge Street. Alternate Sundays, from May 6th.

Bow.
City Arms, Devons Road, Bromley. Fortnightly, on Fridays.

Openshaw.
Drovers' Arms, Ashton Road, Openshaw. Alternate Sundays at 7.30 p.m.

Mexborough.
South Yorkshire Hotel, Mexborough. Last Sunday in the month at 7.0 p.m.

Stockport.
Nicholson's Arms, Lancashire Hill. Last Sunday in the month at 6.30 p.m.

Birmingham.
Small Heath Hotel, Coventry Road. Alternate Sundays.

Battersea.
The Two Brothers, New Road, Battersea, London.

Retford.
Oddfellows' Arms, London Road, South Retford. Monthly at 8 p.m.

Lincoln.
Arcade Coffee Tavern, Lincoln. Last Sunday in the month.

Stratford.
Railway Inn, Angel Place, Stratford, London.

Wolverhampton.
Gladstone Inn, North Road, Wolverhampton. Meetings held monthly.

Grimsby.
Friendly Society Hall, Lower Spring Street. Alternate Sundays at 10 a.m.

Birkenhead.
Borough Hotel, Birkenhead. Meetings alternate Sundays.

Reading.
Blagrave Arms, Blagrave Road, Reading. Meetings Monthly, at 8 p.m.

Blackburn.
Dolphin Hotel, Blackburn.

Peterborough.
Pavilion Hotel, Park Road.

Stourbridge.
At Mr. Barnetts, The Mitre Hotel, Stourbridge. Monthly, Sundays.

Manchester.
Tower Hotel, Cathedral Yard. Every alternate Sunday at 7.0 p.m.

Tondu.
Llynvi Arms, Tondu, South Wales.

King's Cross.
The City of London Hotel, York Road, Cattle Market, London. Meeting nights for year—August 12th, Sep. 2nd, Sep. 23rd, Oct. 7th, Nov. 4th, Dec. 2nd, Dec. 16th.

Cardiff.
Great Western Coffee Tavern. Last Sunday in the month, at 3.0 p.m.

Chester.
Ermine Hotel. Every alternate Sunday after September 9th, at 7.30 p.m.

Branch Secretaries will oblige by sending us the time and place of their Meeting Houses.

LIST OF BRANCHES.

We have now branches at the following places :—

Sheffield
Neath
Plymouth
Exeter
Oxford
Toton
Lincoln
Liverpool
Retford
Gloucester
Llanelly
Mexborough
Nottingham
Newport
Pontypool
Cardiff
Swansea
Skipton
Grimsby
York
Peterboro'
Bradford
Openshaw
Stockport
Leeds
Sandhills
Wolverh'ton
Bristol
Carnforth
Birmingham

LONDON BRANCHES.

Paddington
Kentish Town
Bow
Battersea
King's Cross
Stratford

BRANCHES OPENED THIS YEAR.

Reading
Manchester
Tondu
Birkenhead
Blackburn
Chester
Stourbridge
Worcester

Obituary.

Wolverhampton Branch,
Aug. 17*th*, 1888.

Sir,—It is with regret that I have to announce the death of James Chilton of this branch, and formerly of Gloucester. He was quite a young man and full of promise ; he was killed whilst oiling his engine at Wolverhampton, on Aug. 16th.

I am, yours fraternally,
T. Evans.

Peterborough Branch,
Aug. 16*th*, 1888.

Sir,—It is my painful duty to record the death of one of our number, Mr. W. Ashby, who was killed by his head coming in contact with a bridge whilst examining the water in his tank near Huntingdon station, on August 15th. Deceased member was 54 years of age, and leaves a widow and three children to mourn his loss. He was much respected by his fellow-workmen, and his death has cast a gloom over those with whom he was intimately acquainted.

I remain, yours truly,
J. F., Branch Sec.

LOCOMOTIVE ENGINEERS AND FIREMEN'S

Monthly Journal.

> *"This that they call Organization of Labour is the universal vital problem of the world. It is the problem of the whole future for all who will in future pretend to govern men."*—THOMAS CARLYLE.
>
> *"I know no better definition of the rights of man:—Thou shalt not steal; Thou shalt not be stolen from; what a society were that*—PLATO'S REPUBLIC, MORE'S UTOPIA, *mere emblems of it! Give every man what is his—the accurate price of what he has done and been—no more shall any complain, neither shall the earth suffer any more."*—THOMAS CARLYLE.

VOL. 1. OCTOBER, 1888. No. 9.

THE STORY OF VOLNEY BECKNER.

VOLNEY BECKNER was an Irish sailor boy, and seldom has a story of heroism in humble life been told which can compare with his.

This youthful hero was born in the town of Londonderry, in Ireland, in 1748. His father was a fisherman of that place, so poor that he did not possess the means of giving his boy a common education; but what young Beckner lost by this was more than compensated for by the instructions which he received from his father at home. These instructions chiefly referred to a seafaring life, in which generosity of disposition, encountering difficulties, and a readiness of resource on all occasions, are well-known characteristics. While yet a mere child, his father taught him to move and guide himself in the middle of the waves, even when they were raging in their wildest agitation. He used to cast him from the stern of his boat into the sea, and encourage him to sustain himself by swimming; and only when he appeared to be sinking did he plunge in to his aid. In this way did young Beckner, almost from his very cradle, learn to brave the dangers of the sea, in which, in time, he moved with the greatest ease and confidence. At four years of age he was able to swim a distance of three or four miles after his father's boat, which he would not enter until completely exhausted; he would then catch a rope which would be thrown to him, and, clinging to it, would be dragged on board and carefully attended to.

When the boy was about nine years of age he was apprenticed on board a merchant ship, in which his father appears to have sometimes sailed, and in this condition he rendered himself extremely useful. In tempestuous weather, when the wind blew with violence, tore the sails, and made the timbers creak, and while the rain fell in torrents, he was not the last to aid in taking in the sails. The squirrel does not clamber with more agility over the loftiest trees than did Volney along the stays and halliards. When he was at the top of the highest, even in the fiercest storm, he appeared as little excited as a passenger asleep in his hammock. He was also regardless of ordinary toils and privations. To be fed with biscuits broken by a hatchet, sparingly moistened with water, to take a few hours' sleep stretched on a hard board, and to be suddenly wakened when his sleep was at its soundest, such was the life of Volney; and yet he possessed a sound constitution. He never caught cold, he never knew fear, or any of the diseases springing from pampered appetites or idleness.

Such was the cleverness, the good temper, and the trustworthiness of Volney

Beckner, that at his twelfth year he was judged worthy of promotion, and of receiving double his former pay. The captain of the ship in which he served cited him as a model to the other boys. He did not hesitate to say once, in the presence of his whole crew, "If this little man continues to conduct himself with so much valour and prudence, I have no doubt he will soon obtain a place much above that I occupy." Little Volney was very sensible to the praises that he so well deserved. Although deprived of the advantages of a liberal education, the general instructions he had received and his own experience had opened his mind, and he aspired by his conduct to win the esteem and affection of those about him. He was always ready and willing to assist his fellow-sailors, and by his extraordinary activity saved them in many dangerous emergencies. An occasion at length arrived when the young sailor had an opportunity of performing one of the most gallant actions on record.

The vessel to which Volney belonged was one bound to Port-au-Prince, the chief port in the Isle of Hayti; and during this voyage his father was on board. Among the passengers was a little girl, daughter of a rich American merchant. She had contrived to escape one day from the care of her nurse, who was ill and taking some repose in the cabin, and ran up to the deck. There, while she gazed on the wide world of waters around her, a sudden heaving of the ship caused her to become giddy, and she fell over the side of the vessel into the sea. The father of Volney perceiving the accident, darted after her, and in five or six strokes caught her by the frock. While he swam with one hand to regain the vessel, and with the other held the child close to his breast, Beckner perceived at a distance a shark advancing directly towards him. He called for assistance, the danger being pressing. Every one ran on deck, but no one dared to go farther; they contented themselves with firing off several muskets with little effect; and the animal, lashing the sea with its tail, and opening its frightful jaws, was just about to seize its prey. In this terrible extremity, what strong men would not venture to attempt, filial piety excited a child to execute. Little Volney, seizing a broad sabre, threw himself into the sea. Diving with the velocity of a fish, he slipped under the shark, and thrust his sword into its body up to the hilt. Thus suddenly assailed and deeply wounded, the shark quitted the track of its prey, and turned against the youth who had attacked it, who again assailed it with repeated lounges from his sabre. It was a heart-rending spectacle. On one side the American gentleman trembling for his little girl, who seemed destined to destruction; on the other, a generous mariner exposing his life for a child not his own; and here the whole crew, full of breathless anxiety as to the result of an encounter in which their young shipmate exposed himself to inevitable death, to divert it from his father.

The combat was too unequal, and no refuge remained but in a speedy retreat. A number of ropes were quickly thrown out to both father and son, and they each succeeded in seizing one. Already they were several feet above the surface of the water. Already cries of joy were heard. "Here they are, here they are—they are all safe." Alas, no, they were not saved. At least one victim was to be sacrificed for the others. Enraged at seeing its prey about to escape, the shark plunged to make a vigorous spring, then, issuing from the sea with terrible impetuosity, and darting forward like lightning, with the sharp teeth of its horrible mouth it tore asunder the body of the intrepid and unfortunate boy while he was suspended in the air. A part of Volney's palpitating and lifeless body was drawn on deck, while his father and the fainting child in his arms were saved.

Thus perished, at the age of twelve years and some months, this hopeful young sailor, who so well deserved a better fate When we reflect upon the generous action which he performed in saving the life of his father, and of a girl who was a stranger to him, at the expense of his own, we are surely entitled to place his name in the very first rank of heroes. But the deed was not alone glorious from its immediate consequences. As an example, it survives to the most distant ages. The present relation of it cannot but animate youth to the performance of praiseworthy actions. When pressed by emergencies, let them cast aside all selfish considerations, and think on the heroism of the Irish sailor boy—Volney Beckner.—*To the Sea in Ships.*

Scientific.

RESISTANCE OF AIR AND WATER.

The steam engine that propels a train of cars upon a railroad or a vessel through the water, is called upon to overcome, not only the frictional resistances that may arise, but also the resistance due to what is called, in physics, the resisting media, and whose characteristic is that its molecules are exceedingly mobile, so that they are readily pushed aside to allow of the passage of a solid. The water which opposes the advance of a vessel, or the air that resists the motion of a train, are examples in point. But, however mobile these particles may be, they are nevertheless, inert, impenetrable, and must therefore, be pushed aside to allow the solid to pass. Now this displacement results in a certain amount of resistance, and requires work to be done in order that it may be overcome.

It will be sufficient for the present purpose to examine some of the phenomena which accompany the movement of a solid through air or water, as we rarely meet with others in general practice. Let us take, first, the case of a vessel moving through dead water, like that of a quiet lake, which has no current and a smooth surface.

In the first place, under the action of the bow, the water opens and flows back on either side, forming a series of waves, and these cause a perceptible swell to appear in front of the boat. At the stern, on the other hand, there is a manifest depression due to the vacancy that is left by the passage of the vessel.

Then, this difference in level which is established between the bow and stern, causes a lateral current to be forced against the sides of the vessel ; and the water as it flows in to fill the vacancy thus left produces a complex mass of currents that agitate it, and act in very much the same way and on the same principle that a spring will vibrate to and fro when released from a state of tension.

Again, the waves which we have mentioned, produce in themselves other phenomena that should be pointed out. In proportion as they are forced away from the sides of the vessel, they come back again at the stern in a large mass which is called the following swell. It seems to follow the vessel and is only visibly formed when the speed exceeds ten or twelve feet per second ; and it has apparently the same speed as the boat which it is following.

Finally, the form of the waves depends upon that of the solid. They are constant for the same body ; and for solids of similar shape, in the geometrical sense of the word, the forms of the waves similar also.

The phenomena are readily recognized when nothing happens to disturb their natural action, and they manifest themselves in the air as well as in the water ; in media moving against solid bodies as well as in the instance of moving solids, and also when the two are in motion. The case of a stream flowing against and past piles that are sunk in its waters is an example of the second class. We note them in the track of a boat moving along a river or canal, where, coming to the bank the waves are checked in their onward course, and produce those breakers that are so familiar an accompaniment of a steamboat. Shortly after the passage of the boat, the wave, which did not previously exist, runs up on the bank and then retreats to a level below that of the smooth water. Then these waves begin to rebound and fall in behind the boat to join and increase the size of the follower. But, as we have said, these phenomena only become perceptible after a certain speed has been reached. Again, they are disturbed by outside influences which result from other causes, so that the observer cannot always detect what he is looking for.

It is precisely this last combination that we invariably find in the movement of railway trains, where we feel a strong lateral current from the front to rear against the sides of the cars, while even close to the ground we find another current moving in the direction of the train; therefore when we bear these facts in mind we are no longer surprised at the resistance which a train experiences because of the movements which it sets up in the air by which it is surrounded.

FUEL-BOXES AND FUEL.

In considering the question of the most suitable form and size of fire-box for burning inferior fuel on a locomotive, care should be taken to distinguish between small coal and dirty coal. It is true that the two terms are often synonomous, but it is not always true that all small coal is full of dirt, and few would care to assert that all dirty coal is small. In either case, the useful work done by the coal will depend upon the amount of combustible matter it contains, and the heating surface and cubic contents of the fire-box should be proportioned to this amount of combustible matter rather than to the gross weight of the coal. The fire-box and heating surface have mainly to deal with the products of combustion, and to develop and extract all the heat possible from the combustible matter.

The grate, on the other hand, has to deal with the gross mass of the coal. If the coal is nearly pure, or, in other words, contains little ash, it will continue burning for a long while and leave the grate unincumbered; but if the coal is dirty, the resultant ash and clinker will accumulate, either filling the ashpan or blocking the air way through the grate bars. The combustion will therefore be imperfect, and it is obvious that any excess of heating surface will not mend matters. Either nearly the whole supply of air must be admitted above the fire, or the grate bars must be cleaned. The latter method must ultimately be resorted to in all cases, for it is evidently only a question of time when the fire-box would be filled with ashes and clinker. It is therefore not surprising that shaking grates and drop plates are in very general use, while the admission of air above the burning fuel is the exception rather than the rule. It is obvious that the need of a shaking grate and the admission of air above the fuel apply to a dirty coal, whether large or small. If a given coal is broken up, the amount of dirt remains practically unaffected unless it is picked out by hand, and as the dirt cannot be burnt, it must be got rid of, whether the coal be originally large or small.

The size of the coal does, however, influence considerably the size of the grate, mainly on mechanical rather than on chemical ground. The finer particles necessitate a closer spacing of the grate bars, and consequently a smaller air admission in proportion to the gross area of the grate. But as small coal burns best in a thin fire, this diminution of air way is especially prejudicial. The draft is not only sharper but it encounters less resistance, owing first to the smaller size of the individual particles of coal, and secondly, owing to the thinner layer of coal through which the air has to pass. The greatest velocity of the entering air tends to lift the fire, making sparks, and as the fire is thin, it is soon burnt into holes.

The mechanical effect of the upward rush of air on the small coal may be diminished either by decreasing the volume of the air or by distributing it over a larger area. In other words, a larger proportion of the total supply of air can be admitted above the grate bars or the grate area can be extended.

A little consideration of these self-evident facts shows the reason why the use of an excessive amount of heating surface has not in most cases given satisfactory results from an inferior fuel. The amount of heating surface depends rather upon the amount of steam to be evaporated in a given time than upon the quality of the coal, but the nature and size of the grate should depend largely upon the size of the coal and the amount of ash and clinker.

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FRICTIONAL RESISTANCES.

There are five factors which have a controlling influence over the amount of friction developed between the rubbing surfaces of two bodies: the degree of polish, the interposition of lubricants, the time during which the friction acts, the temperature, and the nature of the substances under investigation. A careful examination of the details of each case is necessary in order to obtain the best results.

The more perfect the polish the smaller will be the surface projections. But when the surfaces have been rubbed together for some time, they gnaw into one another, as it were, even though they may have been previously put in the highest condition of polish of which they are capable. The results of this, therefore, is mutual destruction, and play in the moving parts of the mechanism to which they belong, and which is compensated for by the use of screws and cotters that serve to draw the moving parts together and lessen the play.

When these provisions are not at hand, the play may be taken up by plates or bushings held in position with rivets or countersunk screws. In other cases where the worn parts have been cleaned and dressed, they may be tinned and some alloy with a low co-efficient of friction and suited for the work, poured in, bringing the piece up to its original thickness. It is not generally known that this system of babbitting was once patented. This was so long ago, however, that the fact is almost forgotten.

The wear from friction is never uniform, because all parts have neither the same endurance nor the same amount of work to do, and because the detached particles cut the different surfaces in different degrees. When the metals become heated the prejudicial effects of the friction are increased, and this in turn hastens the destruction that has been begun, by assisting to raise the temperature even to a red heat, which will ignite combustible materials with which the rubbing parts may be in contact. Wear is also due to an excess of pressure or the presence of hard foreign substances, producing practically the same results but without the manifestation of heat that will accompany the grinding that has been referred to.

The possibility of the adjustment of friction surfaces is especially demanded in the case of journals on shafting and axles, where a little play must be given in order to avoid the binding that will inevitably take place as soon as the journal heats and expands, unless provision has been made for it; yet these parts must be held at all times in the exact position in which they were set.

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AN INCH OF RAIN.

The Atlantic Ocean includes an area of 20,000,000 square miles. Suppose an inch of rain to fall upon only one-fifth of this vast expanse, it would weigh 350,000,000 tons, and the salt which as water is held in solution in the sea, and which, when the water was taken up as a vapour, was left behind to disturb the equilibrium, would weigh 16,000,000 more tons, or nearly twice as much as all the ships in the world could carry at a cargo each. It might fall in a day; but occupy what time it might in falling, this rain is calculated to exert so much force—which is inconceivably great in disturbing the equilibrium of the ocean.

If all the water discharged by the Mississippi River during the year were taken up in one mighty measure, and cast into the ocean at an effort, it would not make a greater disturbance in the equilibrium of the sea than the fall of such a rain supposed. And yet so gentle are the operations of nature, that movements so vast are unperceived.

Miscellaneous.

A BIG BANK-NOTE.

An extraordinary affair happened about the year 1740. One of the directors of the Bank of England, a very rich man, had occasion for £30,000, which he was to pay as the price of an estate he had just bought. To facilitate the matter, he carried the sum with him to the bank, and obtained for it a bank-note. On his return home he was suddenly called out upon particular business; he threw the note carelessly on the chimney-piece, but when he came back shortly afterwards to lock it up, it was not to be found. No one had entered the room; he could not, therefore, suspect any person. The director went to acquaint his colleagues with the misfortune that had happened to him; and as he was known to be a perfectly honourable man, he was readily believed. It was only about 24 hours from the time that he had deposited the money; they thought, therefore, that it would be hard to refuse his request for a second bill. He received it upon giving an obligation to restore the first bill, if it should ever be found, or to pay the money himself, if it should be presented by any stranger. About thirty years afterwards (the director having been long dead, and his heirs in possession of his fortune) an unknown person presented the lost bill at the bank, and demanded payment. It was in vain that they mentioned to this person the transaction by which that bill was annulled; he would not listen to it. He maintained that it came to him from abroad, and insisted upon immediate payment. The note was payable to bearer, and the £30,000 were paid him. The heirs of the director would not listen to demands of restitution, and the bank was obliged to sustain the loss. It was discovered afterwards that an architect having purchased the director's house, and taken it down, in order to build another upon the same spot, had found the note in a crevice of the chimney, and made his discovery an engine for robbing the bank.—*Cassell's Old and New London.*

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SIGHT IN SAVAGES.

In some hot humid forest districts, the European who should attempt to hunt or explore with bare feet and legs would be pricked or lacerated at almost every step of his progress, and probably get bitten by a serpent before the day's end. Yet the Indian passes his life there, and, naked or half naked, explores the unknown wilderness of thorns, and has only his arrows to provide food for himself and his wife and children. He does not get pierced with thorns or bitten by serpents, because his eye is nicely trained to pick them out in time to save himself. He walks rapidly, but he knows every shade of green, every smooth and crinkled leaf, in that dense tangle, full of snares and deceptions, through which he is obliged to walk; and much as leaf resembles leaf, he sets his foot where he can safely set it, or, quickly choosing between two evils, where the prickles and thorns are the tenderest, or, for some reason known to him, hurt least. In like manner he distinguishes the coiled up venomous snake, although it lies so motionless—a habit common to the most deadly kinds — and its dull imitative colouring is so difficult to be distinguished on the brown earth, and among grey sticks and sere and variegated leaves.

A friend of mine, Fontana of Buenos Ayres, who has a life-long experience with the Argentine Indians, expresses the opinion that at the age of twelve years the savage of the Pampas has completed his education, and is thereafter able to take care of himself; but that the savage of the Gran Chaco—the sub-tropical Argentine territory bordering on Paraguay and Bolivia—if left to shift for himself at that age would speedily perish, since he is then only in the middle of his long, difficult, and painful apprenticeship. It was curious and pitiful, he says, to see the little Indian children in the Chaco, when their skins were yet tender, stealing away from their mother, and trying to follow the larger ones playing at a distance. At every step they would fall, and get pricked with thorns or cut with sharp-edged rushes, and tangled in the creepers, and hurt and crying they would struggle on, and in this painful manner learn at last where to set their feet.

The snake on the ground, coloured like the ground, and shaped like the dead curved sticks or vines seen everywhere on the ground, and motionless like the vine, does not more closely assimilate to its surroundings than birds in trees often do —the birds which the Indian must see. A stranger in these regions, even the naturalist with a sight quickened by enthusiasm, finds it hard to detect a parrot in a lofty tree, even when he knows that parrots are there; for their greenness in the green foliage, and the correlated habit they possess of remaining silent and motionless in the presence of an intruder, make them invisible to him, and he is astonished that the Indian should be able to detect them. The Indian knows how to look for them; it is his trade, which is long to learn; but he is obliged to learn it, for his success in life, and even life itself, depends upon it, since in the savage state Nature kills those who fail in her competitive examinations.

The reader has doubtless often seen those little picture-puzzles, variously labelled "Where's the Cat?" or "Mad Bull," or "Burglar," or "Policeman," or "Snake in the Grass," &c., in which the thing named and to be discovered is formed by branches and foliage, and by running water, and drapery, and lights and shadows in the sketch. At first one finds it extremely difficult to detect this picture within a picture; and at last—with the suddenness with which one invariably detects a dull-coloured snake, seen previously but not distinguished—the object sought for appears, and is thereafter so plain to the eye that one cannot look at the sketch, even held at a distance, without seeing the cat, or policeman, or whatever it happens to be. And after patiently studying some scores of hundreds of these puzzles one gets to know just how to find the thing concealed, and finds it quickly—almost at a glance at last. Now the ingenious person that first invented this pretty puzzle probably had no thought of Nature, with her curious imitative and protective resemblances, in his mind; yet he might have taken the hint from Nature, for this is what she does. The animal that must be seen to be avoided, and the animal that must be seen to be taken, are there in her picture, sketched with such cunning art that to the uninstructed eye they form only portions of branch and foliage and shadow and sunlight above, and dull-hued or variegated earth and stones and dead and withering herbage underneath.—*Longman's Magazine.*

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A RED INDIAN'S HOME.

In the August number of one of the magazines Mr. C. H. Farnham gives an interesting description of the Indian's home. These Indians, by their mode of living, seem to be the shyest and most nomadic and isolated of creatures; but in fact they have surprisingly strong social qualities. Betshiamitis is the Indian's summer resort by the seaside, where he lives in comparative luxury, and enjoys a taste of civilisation. The wigwam is still his favourite cottage, and certainly this primitive and picturesque shelter is the best suited to his life and character. It has a natural form, like the mound of a mole—an elliptical dome about 7 ft. high and 18 ft. long. It is made of bent poles sustaining long strips of birch-bark; the windows are an irregular opening at each end covered with cotton, and the little door is closed with a curtain. The men wear the ordinary costumes of to-day with a red sash about the waist. The women have but one noteworthy article of dress, the Montagnais cap, with its alternate black and red pieces meeting at the top, and its band of bright silk embroidery; they wear a red kerchief or a shawl over the shoulders. Their hair is bound up in a queer little club covering each ear. While the men lounged and smoked (inside a lodge which Mr. Farnham visited), the women chewed gum with remarkable energy. These sat on a piece of matting near the windows and embroidered their caps and moccasins. The children and dogs kept up a moderate activity in coming and going over the crouching figures. The lodge was furnished with a stove, guns, chests of personal effects, cooking utensils, clothes hanging on poles on each side, and heaps of blankets and pillows pushed up against the wall; and there were bags, boots, and bottles enough to fill up the nooks. As there were no beds, shelves, tables, etc., the poles of the roof held a great part of these domestic articles; shoes, stockings, and a pail of water were about Mr. Farnham's head; further on were a branch of tamarack, blest for religious uses, vials of holy-water, chaplets, and pictures of the Pope. Even the baby was hung up on the wall in a rude hammock. The community comb is kept in a sheath attached to a piece of porcupine's tail armed with sharp quills; this device for cleaning is so efficient as to be rather suggestive. The low arched roof of white poles and rich bark was dimly lighted by the cotton windows near the ground; the walls were shaded by masses of dark clothes, relieved here and there by strong reds and yellows; and the full light fell upon the squaws at the window with bright silks on their laps. It had a domestic cheerful aspect on that sunny day; but it was an odd little place as a home of ancient date. For, although it is fragile and portable, yet it is essentially the same house that sheltered the men of this continent unknown ages ago. Mr. Farnham inferred that the four families living there—thirteen people and nine dogs—had each a certain part of the lodge, but no boundaries appeared to be established. At night they assembled on their respective plots of floor, he supposed, and drew their blankets over their respective families.

MOTHERS & DAUGHTERS.

In every mother were the bosom friend of her daughters, many bitter pangs would often be saved to both. As it is there are mothers who know far less of the hearts and the lives of their daughters than some companions of the girls, who may be desirable for them to associate with, but may be not. Girls are left at the most dangerous period of their life to pick up their knowledge of the world into which they are going, and the dangers to which they are exposed, in a perfectly haphazard fashion. Their mothers have never taught them to look to them for guidance, either from sheer negligence, or from a false and criminal mock modesty.

A girl who has gleaned all her knowledge of life in the delusive mirror of fiction, as is too often the case, has her silly romantic heart stuffed with foolish dreams. She is susceptible as tow to flame to the first bit of romance that comes in her way. She immediately fancies herself in love, and she has been led to look upon love as lord of all, as the one thing to be regarded in life, before the all-subduing power of which everything must give way. The consequences are obvious. She may make a hasty marriage, which at best is a rash leap in the dark; under certain circumstances, she may shipwreck her life before her eyes are opened to the truth. Who is to blame? Chiefly the mother, whose duty it was, as well as her privilege, to safeguard her daughter in every possible way that her own experience of girlhood and her motherly anxiety could suggest.

But in order to exercise a real influence over her daughters, a mother must sympathise with them; she must be, as we have said, their bosom friend. They must have no secrets from her, but must pour all their troubles, and all their joys, into her willing ear, She must study their hearts, their eyes, and their faces, so that she can judge of their need a glance, and tell at once whether there is anything being concealed from her that she ought to know. A true mother will be her daughter's adviser in her reading, in her theatre-going, and will know how to criticise anything in the nature of sham sentiment or doubtful morality in such a way as to teach her true views of life without lecturing her. She will do her utmost to disabuse her daughter's mind of wrong impressions, and to set clearly before her all the concealed pitfalls that it will be necessary for her to be on her guard against. A wise mother will do this, but too many mothers are not wise. Wisdom, however, is the fruit of love, and a mother who truly loves her daughter will neglect nothing that is necessary for her good.

MEDALS.

Probably the first medal conferred in this country for service in the field was one authorised by Charles I. to be issued in the year 1643 to such soldiers as might distinguish themselves in "forlorn hopes." It was to be made of silver, and worn on the breast of every man who should be certified by the Commander-in-Chief to have done faithful service in the forlorn hope. It was, in fact, the Victoria Cross of that time, the Commissioners and Wardens of the Mint being required to keep a register of the names of all those upon whom the decoration was conferred. In June 6, 1643, Charles I. ordered a gold medal to be struck for Robert Welsh, an Irish gentleman, who at the battle of Edgehill recovered the standard of the King's Own Regiment, which had been taken by the Parliamentary forces, and who also captured two pieces of cannon, for which services he had been previously knighted. An oval badge of gold was conferred upon the officers of the Parliamentary army present at the battle of Naseby, June 14th, 1645. In 1649 the Long Parliament passed an Act directing that the tenth part of all prizes due to the Lord High Admiral should be paid to the issue of medals or other rewards for distinguished services at sea. The first instance, however, of war medals being conferred generally on both officers and men occurred in the year 1650, when the House of Commons ordered a medal to be struck and issued to the officers and men who had taken part in the battle of Dunbar, on the 3rd of September of that year. This medal was issued of two sizes—a large one to the officers and a small one to the men. The Waterloo medal was the first given to all ranks alike.

ST. SWITHIN'S FORTY DAYS.

Human nature is weak, and is fond of pegs. But times of commemoration are not hastily to be condemned, though the absurdity of fixing solar dates for celebrations is well illustrated in this case. St. Swithin was tutor of King Alfred and Chancellor of his father's kingdom. In the former capacity he accompanied Alfred to Rome, and in 1852 became Bishop of Winchester. He died in the very odour of sanctity, "a rich treasure of all virtues, a great builder of churches, and very attentive" to his duties. He travelled with his clergy by night to save time and avoid ostentation, and always on foot. It is said that he by an Act of the Wittinagemote first enforced the payment of tithes as a universal obligation. Details, which need not now be repeated, describe the conditions under which his day, the 15th of July, began to be associated with meteorological phenomenon. Now, the 15th of July of his day is not the 15th July of our day. In early times the moon's changes furnished the rough data on which a calendar was based, though earlier still, the Egyptians, without regard to those changes, fixed the year at 365 days. The Jews, from their earliest times (and to this they adhere to-day), divided the year into twelve lunar months, adding a month when the necessity arose for squaring the year with the obvious changes of the season. The Julian calendar (constructed 48 B.C.) introduced new conditions, giving each month the days it now has. Substantially but not strictly accurate, this arrangement had in 1582 years A.D. resulted in a hitch of ten complete days. The movable feasts of the Church were thus thrown out of gear. Tho Pope decreed that ten days should be deducted from the calendar, thus making the 5th October of that year the 15th. Protestant countries generally refused to follow this, till the inconvenience became so great that in 1751, when the discrepancy amounted to another day, an Act of Parliament was passed which in this country practically adopted the Gregorian style. Russia, however, still adheres to the Old Style, and our 1st of May is her 13th. This great change accounts for much of the speculation why the weather is apparently so much altered for the worse in the spring in our own country, for the May-day of our time was the 12th of May, 140 years ago. Thus all fixed dates of Saints' days, St. Swithin amongst them, are eleven days wrong.

A similiar delusion about the weather is still more common in connection with the changes of the moon. An eminent French astronomer kept an exact record for 19 years of this relation, and he proves that the popular notion is without foundation, and that a record kept of which side of the bed you get out of in the morning would present just as accurate forecasts of the weather. Throughout the epistles to the Gentile converts to Christianity the observance of sacred days is both directly and indirectly condemned. Thus good St. Swithin is not at all responsible for the use made of his name.

* * *

THE TREE OF KNOWLEDGE.

In the old town of Duxbury, New England, at the junction of two prominent crossroads, stands a post, upon which one reads, "The Tree of Knowledge." It seems that in by-gone days, when the mails were transported in stage-coaches and post-chaises, there stood a big tree on this spot, into which was cut a large, deep hole, where was deposited such mails as belonged to the townspeople. Hence it was known as "the tree of knowledge." It is a suggestive reminder of modern degeneracy to reflect that within memory of men now living, rural society in New England held the ten commandments in such solemn respect that a precious mail could be left at the lonely crossroads, with no other protection than the honour and virtue of the people. Civilisation, with the accompanying boon of high protection, had not yet given us the tramp. We seldom realise the cheapness of knowledge as we enjoy it to-day, compared with the days when the "tree of knowledge" received its precious charge at New England crossroads. But the "tree of knowledge" has come to have a vastly wider significance lately through the successful art of manufacturing paper from wood pulp. But a comparatively short time ago newspapers were almost wholly dependent upon rags for the material which fed their presses. To-day the tree that nods to the rising sun, may at midnight be rushing through mammoth presses, and to-morrow morning be in the hands of thousands of readers, dispensing the freshest and fullest knowledge of a living, moving world. The ancient Druids worshipped the trees. Knowledge has always been associated with trees, and the scriptures have given the "tree of knowledge" a solemn and lasting significance. The "tree of knowledge," such as is to spread the news daily to millions of readers, and shape the thought and social tendencies of the future, is a thing of immense suggestiveness and infinite promise for good or evil. Yes, the very trees have come to speak, in a sense that the Druids, who worshipped in the primeval woods, never dreamed of. Who does not love the trees? They furnish us food, shelter and knowledge. Science will doubtless enable them to clothe us, too, in due time.

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LIBRARIES OF RUSSIAN NOBLES.

It will be news to half the world that the Russian nobles are sedulous collectors of books and manuscripts. Prince Woronzoff, for instance, has a library of 12,000 volumes in St. Petersburg, and possesses another equally as large at Alupka. The Princess Lunoff's library contains nearly 13,000 books, most of which were collected by her father, Bibikoff. In Slavonic literature it is especially rich, and it contains about six hundred works in various languages on numismatics. The late Minister of Justice, Count Panin, had a library of 11,000 volumes, which was remarkable for an encyclopædic series of works relating to the legislation of the different European States. He had also considerable libraries in the Crimea and at Marsino, near Moscow. The library of Count Scheremetjeff, the foundations of which were laid by the conqueror of Livonia, contains 25,000 volumes, many *incunabula*, and a perfect treasury of ecclesiastical music. The present owner has himself increased his great literary heritage by the addition of nearly 12,000 volumes. He has been a diligent collector of books bearing upon Russian and Slavonic history and topography. The library of his uncle, Count A. D. Scheremetjeff, is remarkable for its wealth in modern English literature. Princess Wäsemski has a library of about 10,000 books, principally history, geography, and travels; while Prince P. P. Wäsemski has a collection of about 22,000 volumes at Ostaschkoff, and another containing not less than 10,000 volumes in St. Petersburg. He also owns a splendid collection of Russian autographs. Count Bobrinski's library is renowned for its wealth in French illustrated works, and Count Levaschoff's for the number of its Elzevirs and its completeness in respect to the French literature of the eighteenth century. Count Tolstoi has, upon his estate at Räsanchen, a library of some 12,000 volumes of Church history, architecture, and pedagogy. This by no means exhausts the list of the great libraries belonging to the aristocratic families of Russia.

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A NIGHT SCENE IN THE BESSEMER STEEL WORKS.

"The cavernous room is dark, the air is sulphurous, the sounds of suppressed power are melancholy and deep. Half revealed monsters with piercing eyes, crouch in the corners; spectral shapes ever flit about the wall, and lurid gleams of light anon flash in your face as some remorseless monster opens it red-hot jaws for its iron rations. The melter thrusts a spear between the joints of its armour, and a glistening yellow stream spurts out a moment, and then all is dark once more. Again and again he stabs it, till six tons of its hot and smoking blood fill a great caldron to the brim. Then the foreman shouts to a thirty-foot giant in the corner, who thenceforth stretches out his iron arm and gently lifts the caldron away into the air and turns out the blood in a hissing, sparkling stream, which dives into the white hot jaws of another monster—a monster as big as an elephant, with a head like a toad and a scaly hide. The foreman shouts again, at which up rises the monster on its haunches, growling and snorting with sparks and flame. What a conflict of elements is going on in that vast laboratory, a million balls of melted iron tearing away from the liquid mass, surging from side to side and plunging down again only to be blown out, more hot and angry than before; column upon column of air squeezed solid like rods of glass by the power of five-hundred horses, piercing and shattering the iron at every point, chasing it up and down, robbing it of its treasures only to be decomposed and hurled back into the night in roaring blaze. As the combustion goes on, the surging mass grows hotter, throwing out splashes of liquid slag, and the discharge from its mouth changes from sparks and streaks of red and yellow gas to thick, full white dazzling flame. But such battles cannot last long. In a quarter of an hour the iron is stripped of its every combustible alloy and hangs out the white flag. The converter is then turned down on its side, the blast shut off, the recarbonizer run in. Then for a moment the war of the elements rages again; the mass boils and flames with higher intensity, and with a chemical reaction sometimes throwing it violently out of the converter's mouth; then all is quiet, and the product is a liquid, milky steel, that pours out into the ladle from under its roof of slag, smooth, shining, and almost transparent."

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Railway Items.

COLLISION AT ASHBURYS STATION M. S. & L. RAILWAY.

MAJOR MARINDIN REPORTS AS TO THE RESULT OF HIS ENQUIRY INTO THE CAUSES OF A COLLISION WHICH OCCURRED ON THE 29TH ULTIMO AT ASHBURYS JUNCTION AS FOLLOWS :—

In this case a special return excursion train for Oldham, consisting of engine and tender, one first-class and 13 third-class carriages, and two brake-vans, all fitted with the simple vacuum brake which was started from the down goods line at Ashburys station at about 10 p.m. to go across on to the up main line, was, by a mistake of the singleman in Ashburys junction signal-box, turned on to the down instead of the up main line, and met a light engine which was running tender first from Guide Bridge to Manchester, with the down signals off for it.

The passenger train had been brought nearly to a stand, but the light engine was still running at some speed, probably at not less than 15 miles an hour, when the collision occurred.

No vehicle left the rails.

Twenty-nine passengers are returned as being injured, two of them having to be taken to the infirmary.

The driver of the passenger train was rather badly hurt, and his fireman, who jumped off the engine, was shaken.

The driver and fireman of the light engine were slightly injured.

The tender of the light engine was considerably damaged, but the damages to the passenger train were very slight, being confined to the front of the engine, and to the breaking of some buffer-castings in the two front vehicles.

In the permanent way two switches were bent.

At Ashburys station the up and down main passenger lines of the Manchester, Sheffield, and Lincolnshire Railway from Manchester to Guide Bridge run from west to east parallel with and on the south side of the up and down goods line of the same company. The up passenger platform is between the up passenger line and the down goods line.

About 226 yards east of the station is Ashburys junction, where the passenger line to Stockport (the Sheffield and Midland line) leaves the line to Guide Bridge, and between the station and this junction there is a double line cross-over road leading from the goods lines to the passenger lines, with facing points upon the down main passenger line and upon the up goods line.

In order to allow a train to run or to be shunted directly from the down goods line to the up passenger line, or *vice versa*, there are slip points upon the road leading from the down passenger to the down goods line. A train passing from the down goods to the up passenger line has to go through No. 7 points on the down goods line, which are properly trailing points, and No. 3 points, the slip points, both these sets of points becoming facing points to such a train, and neither being properly fitted with the usual facing point safety appliances. There is no fixed signal for governing this operation.

The signal cabin which is 198 yards east of the platform, immediately opposite to the main line points of the junction of the lines leading to the goods lines, contains 29 working levers, which are interlocked, but not correctly so, as the points worked by Nos. 3 and 7 levers are not interlocked with the down home-signal, as they ought to be.

This signal worked by No. 21 lever, can be lowered when No. 7 points are turned for a train to back off the down goods line, even when No. 3 points are not turned, so as to take this train on to the up passenger line, thus protecting the down passenger line. There is an up main line starting signal on the platform worked by No. 2 lever, and splitting signals for the two junctions opposite to the signal cabin, and there are also up goods line signals for going straight along the up goods line, and for running on the proper line to the up main line.

The gradient is a falling one of 1 in 173 towards Manchester.

Priory junction signal box, the next box towards Guide Bridge, is 25 chains; and Ardwick No. 1 box, the next towards Manchester, is 69 chains from Ashburys junction box.

Block working is in force upon the passenger lines, but not upon the goods lines.

This collision, though actually due to the forgetfulness of the signalman in Ashburys junction cabin, in omitting to make the proper road for the excursion train before signalling to the driver to start, was the consequence, inevitable sooner or later, of the habitual and long-continued use for busy excursion passenger traffic of a station quite unfitted for it, and of an improper mode of working, under which passenger trains are started in the wrong direction from a goods line, without even the necessary fixed signal for such an operation. If there had been an interlocked signal for a train to run from the down goods line to the up passenger line, this signal could not have been lowered until the proper points had been turned, while even without such a signal, if the interlocking of the existing levers in Ashburys junction cabin had been correct, the lowering of the down home-signal, which on this occasion was off for the light engine, would have locked No. 7 points, through which the train passed off the down goods line, unless No. 3 points had been lying so as to turn the train on to the up passenger line.

Ashburys station is the nearest on the Manchester, Sheffield, and Lincolnshire Railway to Belle Vue Gardens, to which there is during the summer a heavy excursion traffic, so that, as appears from the evidence, return excursion trains are started from the goods lines at this place on an average four nights in the week from June to September, the passenger line being too crowded to be available.

Most of these trains start from off the down goods line to the up passenger line, and a few from the up goods line in the same direction. In the former case the passengers are loaded from the down passenger platform, and the trains start along the wrong line without proper signals; in the latter case passengers have to walk across the down goods line, and are loaded from the ballast, but the trains start in the right direction under fixed signals. In both cases the trains when standing to be loaded are not under the protection of block working, which is not in use on the goods lines.

The fact that many hundreds of trains have been so worked at night, without any accident until that now under consideration, is one which speaks volumes for the care and attention of the Company's servants, but no time should be lost in providing proper and safe accommodation for this excursion traffic, which, it may be assumed, is a lucrative one.

The signalman who made the mistake in this case, and who does not attempt to evade the responsibility for it, had at the time been on duty for eight hours. His proper tour of duty had just come to an end, but, owing to the sudden illness of the man who should have relieved him, he had, unavoidably, been ordered to remain on duty until a relief man could be obtained.

Both the drivers concerned were evidently keeping a good look out, and deserve credit for their promptness in finding out the mistake which had been made, and in using all the means at their disposal to avert the collision, which might have been a very serious one if either of these men had been careless or inattentive.

The Midland Railway Company have recently completed a new spur line from the west end of Ashburys station to join the Lancashire and Yorkshire Railway, for the purpose of running trains over the Sheffield and Midland Railway, through Ashburys station, and over the new spur direct on to the Lancashire and Yorkshire system. The junction at the west end of Ashburys station has not yet been made, but it will involve the conversion of a portion of the Manchester, Sheffield, and Lincolnshire goods lines into passenger lines, and it will be the duty of the officer inspecting the junction, when made, to see, not only that the signalling and other arrangements are satisfactory, but that Ashburys station, through which the new traffic will pass, is laid out according to modern requirements. In this connexion the nature of the traffic at the station will have to be considered.

THE TRANSCASPIAN RAILWAY.

HOW THE BUILDERS LIVE.

A charming sketch of the quarters of the chief architect of the Transcaspian Railway, General Annenkoff, is given in the *Pietersburger Zeitung*. Nearly midway between Samarcand and Amu-Daria, says a correspondent at the gipsy encampment, on a soil of clay and gravel, stands the railway train in which we live. It consists of from forty to fifty carriages. The first carriage is the residence of General Annenkoff; on the lower floor are his work-room, his sleeping apartment, and the rooms of his secretary; on the upper floor are the quarters of his servants and interpreters. The second carriage is the general dining hall, in which from 12 to 20 persons breakfast and have dinner—namely, the officers of the railway battalion, the officials, the secretary, and invited and casual visitors. The casual visitors are persons who have come by the new railway, which has not yet been publicly opened, and who are on their way further into the country. The next carriages are made into a kitchen and a pantry, which is replenished by purchases at the two nearest towns and at the surrounding villages. One of the general's servants drives twice a week to Tchardshui to buy white bread, vegetables, and now and then excellent fish and fresh caviar. The Buchara beef and mutton are very good and cheap; the natives have plenty of poultry for sale and enormous quantities of wild ducks, thousands of which have their homes on the inland lakes. Dried fruit, rice, and oatmeal are bought off the Persian traders who follow the new railway line, and Buchara melons, the excellence of which Sultan Ibn Batnia recognised as long ago as 1335, and pomegranates are every day brought fresh to our doors. The officers' carriages are charmingly decorated with carpets and rugs which the Emir has sent them. On the upper floors of the carriages their servants and grooms have their rooms, and the saddle horses live in front of their train, where they are tied to posts. A post and telegraph office, a hospital with a doctor's residence, and a chemist's shop complete the staff quarters, besides which there are a number of carriages for workmen. At Kisil-Tepo the station is finished, and at many other stations across the lines the work is briskly going on, and thousands of newly planted trees round them are just beginning to shoot.

THE AUSTRIAN RAILWAYS.

The Austrians claim to have been the first Continental nation in Europe to establish railways, commencing in 1828, with a salt carrying line between Linz and Budweis, though it was not till 1838 that the first locomotive ran on an Austrian Railway from Vienna to Wagram. From 1838 to 48 the progress was slow, only 669 miles having been built, the government objecting to the building of new lines or the completion of those commenced. At the end of the next decade, 1858, the the mileage had increased to 1,483 miles, and in 1868 to 2,746 miles. During the decade, 1868-78, the government which had given way to private management, undertook the construction of lines, on account of the prevailing distress, and the amount completed at the end of the decade was 6,972 miles, which has grown to 8,719 miles at the commencement of the present year.

RAILWAYS OF THE UNITED KINGDOM.

The general report of the Board of Trade in regard to the finances and traffic of the railway companies of the United Kingdom for the year 1887, shows that the paid-up capital was £845,972,000, being an increase of £17,628,000 on the capital in the year 1886. The receipts from traffic were, in millions sterling, 70·9, being an increase of 1·3 on the receipts for 1886. The passenger traffic receipts were £30,573,000, of which £18,293,000 represented third class traffic, in which department there was an increase of 31·1 per cent. on the previous year.

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STATISTICS OF RAILWAY PASSENGERS.

Mr. Griffen's statistics of railways in 1887, show that in England and Wales the number of first-class passengers was twenty-five millions, of second-class fifty-eight millions, whilst third-class passengers reached the enormous number of five hundred and sixty-four millions. Turning to the receipts we find that the earnings from the first and second classes were about two and a half millions respectively, or slightly under five millions for the two. But the earnings from the third class compartments were nearly sixteen millions, or about six times as much as was earned from either the first or the second class.

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LONDON AND NORTH-WESTERN RAILWAY STATISTICS.

At a meeting recently held at Greenwich, Mr. Webb, Mayor of Crewe, gave a few notable statistics concerning the company with which he is associated. The train mileage of the London and North-Western Railway, he said, is equal to a journey round the world every four hours, and the railway tickets it issues in 11¼ months would form a girdle round the world one inch wide. Every day the company boils 20,000 tons of water into steam, and burns 3,000 tons of coal in the process, while its earnings at the present moment are at the rate of £20 per minute.

PARCHMENT FOR AXLE BEARINGS.

Experiments are being made on Prussian railways with axle boxes fitted with bearings of vegetable parchment in place of brass. The parchment is strongly compressed before being used, and it is thoroughly dried to prevent subsequent shrinkage. Wooden rings are placed on the outside of the bearings, fitting the collars of the journal. An emulsion of water and oil and all the mineral oils are used as lubricants. The parchment soon becomes impregnated with oil, and is able to go a long time without a renewal of lubrication. It is between the body of the journal and the thin edge of the parchment segments that friction takes place, The claim is made that the compressed paper bearings make a tough material that is superior to metal. Such bearings are also in use in a German sawmill, with satisfactory operation.

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FAILURE OF AXLES.

Of the 281 axles which failed on our railways last year, 161 were engine axles, 145 crank or driving, and 16 leading or trailing; 20 were tender axles, 3 were carriage axles, 94 were waggon axles, and 3 were salt van axles; 53 waggons, including the salt vans, belonged to owners other than the railway companies. Of the 145 crank or driving axles, 82 were made of iron and 63 of steel. The average mileage of 80 crank or driving axles made of iron was 216,412 miles, and of 63 crank or driving axles made of steel, 235,649 miles. Of the 244 rails which broke, 96 were double-headed, 147 were single-headed, and 1 was of the bridge pattern; of the double-headed rails, 52 had been turned; 26 rails were made of iron, and 218 of steel.

THE MONSOON AND RAILWAYS IN CEYLON.

The *Engineer*, commenting upon the Monsoon and Railways in Ceylon, says:-- "Very recently a telegram of a most alarming character was privately transmitted to London from Ceylon, to the effect that no less than two miles of but lately finished railway in that colony had been bodily carried down the mountain sides by the floods arising from the almost unprecedented rainfall of the present monsoon. Desiring confirmation of this report before giving currency to it, we sought it at the Colonial Office, but found no information had been received there having any such character. We, therefore, hoped that the news was at least materially exaggerated; but the mail just in, although describing the damage done in less alarming terms than those of the telegram privately received, announces such a series of mishaps from landslips as are almost tantamount to the wording of that telegram. The floods flowed nine feet deep over the metals in many places, and railway traffic had to be entirely suspended for some forty or fifty miles on the upper ranges of the mountain lines consequent upon the extensive landslip which resulted. These, the *Ceylon Observer* informs us, it will take probably a month or six weeks to remove, while long sections of the line have bodily settled between 1ft. and 2ft., and in one place the rails were suspended as much as 4ft. above the level of the ground. It is probable that in the aggregate fully the two miles named in the telegraphic dispatch have either been carried away or have so settled as to require extensive rebuilding. No damage of this kind appears to have resulted from the floods on the celebrated Kaduganawa incline, this being partly due to the longer time it has been constructed, insuring more perfect consolidation, and partly to the fact that its side-long cuttings are more generally upon solid rock than in the case of the later constructed extension."

Useful Hints.

MEDICINAL QUALITIES OF ONIONS.

The free use of onions for the table has always been considered by most people as a healthful and desirable practice, and, but for their odour, which is objectionable to many, they would be found more generally on our dining tables. For a cold on the chest there is no better specific, for most people, than well boiled or roasted onions. They may not agree with everyone, but to persons with good digestion they will not only be found to be a most excellent remedy for a cough, and the clogging of the bronchial tubes which is usually the cause of the cough, but if eaten freely at the outset of a cold, they will usually break up what promised, from the severity of the attack, to have been a serious one. A writer in one of our medical journals recently recommended the giving of raw young onions to children three or four times a week, and when they get too large and strong to be eaten raw, then boil or roast them, but do not abandon their free use. Another writer advocating their use, says: During unhealthy seasons, when diphtheria and like contagious diseases prevail, onions ought to be eaten in the spring at least once a week. Onions are invigorating and prophylactic beyond description.

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CELERY AS FOOD AND MEDICINE.

New discoveries—or what claim to be discoveries—of the healing virtues of plants are continually being made. One of the latest is that celery is a cure for rheumatism; indeed it is asserted that the disease is impossible if the vegetable be cooked and freely eaten. The fact that it is always put on the table raw prevents its therapeutic powers from being known. The celery should be cut into bits, boiled in water until soft, and the water drunk by the patient. Put new milk, with a little flour and nutmeg, into a saucepan with the boiled celery, serve it warm with pieces of toast, eat it with potatoes, and the painful ailment will soon yield. Such is the declaration of a physician who has again and again tried the experiment, and with uniform success. He adds that cold or damp never produces but simply develops the disease, of which acid blood is the primary and sustaining cause, and that while the blood is alkaline there can be neither rheumatism nor gout. Statistics show that in one year (1876) 2,640 persons died of rheumatism in this country, and every case, it is claimed, might have been cured or prevented by the adoption of the remedy mentioned. At least two-thirds of the cases named heart disease are ascribed to rheumatism and its agonising ally, gout. Smallpox, so much dreaded, is not half so destructive as rheumatism, which, it is maintained by many physicians, can be prevented by obeying Nature's laws in diet. But, if you have incurred it, boiled celery is pronounced unhesitatingly to be a specific. The proper way to eat celery is to have it cooked as a vegetable after the manner above described. The writer makes constant use of it in this way. Try it once, and you would sooner do without any vegetables, with the single exception of the potato, rather than celery. Cooked celery is a delicious dish for the table, and the most conducive to health of any vegetable which can be mentioned.

SCALDED CHILDREN.

We often read of cases where little children succeed in scalding themselves to death either by falling into tubs of boiling water or by pulling over vessels of boiling water upon themselves. We lately heard of a child who drank from the nose of a tea-pot of hot water, before it could be hindered, sustaining fearful injuries; and it may be well for our readers to know what to do if a similar case should turn up in their own experience. Cod-liver oil and lime-water mixed in equal parts is to be administered, a tea-spoonful at a time, to the scalded throat, once an hour, given slowly so that the healing mixture trickles down almost of itself. This not only heals the injured part, but supports the strength of the child, as food would do, until other nourishment can be taken. For external scalds and burns there is nothing at once so cooling and curative as the ointment of oxide of zinc; but as every one does not have this in the house, it is as well to plunge the injured part in ice-water as to do anything else, whenever the plunge is practicable, and when it is not, to keep cloths upon it wrung out of ice-water. This excludes the air, at any rate, and allays the pain, and allows the strength to rally, while it is within the reach of every body.

AN EGG TEST.

To test the age of eggs, dissolve 5oz. of kitchen salt in a quart of water. A new-laid egg will at once sink to the bottom; an egg one day old will sink in the solution, without, however, reaching the bottom; an egg three days old will float in the liquid; whilst older eggs will remain quite at the surface.—*Les Mondes.*

ETCHING ON GLASS.

A clean glass plate is coated, without being warmed, with a solution of gum damar in ether. The exact strength of the varnish is immaterial, though it should not be too weak. When the ether has evaporated, we can light up our smoke factory—the benzoline lamp—and hold the glass, film downwards, in the flame, moving it about with a circular motion to prevent the heat being concentrated in one part, which would probably crack the plate. The centre of the flame consists of vapour of benzoline, which softens the damar to such an extent that the soot is absorbed by the film as fast as it settles thereon. If this simple operation is properly done, a quarter or half plate sized glass can be smoked to opacity, and will have a smooth, bright surface, which is in excellent condition for being etched, and is quite hard enough to form its own protection—that is, it does not require varnishing.

Humorous.

THE COLONEL'S SURPRISE.

In the front corridor of the Eden Musée, in Chicago, there usually sits the wax figure of a fashionably-dressed woman. The work has been so well done, the wax has been so nearly given the actual tint of the human flesh, that many close observers are deceived. Several days ago, Colonel Bob Fitzgerald, of Little Rock, and Dave Adams, the celebrated detective, of Arkansaw, came to the city. While Fitzgerald was dozing at his hotel one morning, Adams went to the Musée. The fashionably-dressed wax woman attracted his attention. He bowed to her, with that graceful courtesy which has ever distinguished the southern detective, and said:—

"Miss, I am a stranger in this village, and therefore am reduced to the necessity of asking you if you can tell me where I can get some home-spun chewing tobacco."

The woman—and very naturally, too—refused to make a reply. Adams, upon a closer inspection, finding that the figure was wax, slapped himself in a sort of boyish glee, and went back to the hotel to bring Colonel Fitzgerald. He would have sport with his friend. Shortly after Adams went the manager of the Musée removed the figure of the woman for the purpose of arraying her in another gown, as the fashion had changed since morning. The chair was left in its usual place. A few minutes later Mr. J. W. M'Bein and wife came out of the Musée.

"I will sit here and rest a few minutes," said Mrs. M'Bein, "I have walked around until I am nearly worn out."

She sat down on the chair recently occupied by the wax figure. Mr. M'Bein stood looking at something on the wall. Adams and Fitzgerald entered the corridor.

"Do you see that lady sitting there?" said Adams.

"Yes," Fitzgerald replied, "and she's pretty smooth-looking, too."

"Well, I should say so. She is a friend of mine, one of the high-flyers. Goes in the best society in town. Used to know my folks. Wants us to come out and see her."

"What are you trying to give the colonel?" Fitzgerald replied. "You know that you never saw her before."

"That's where you are off. You bet I go among the best people when I get away from home. I can go up and put my hand on her head and she won't say a word."

"I'll bet you can't."

"How much?"

"Ten dollars."

"All right."

Adams walked up to the woman. She must have been deep in thought, for she paid no attention to him. He turned, looked with a conquering glance at Fitzgerald, and placed his hand on Mrs. M'Bein's head. The woman, startled out of her reverie, sprang up with a shriek. Adams threw up his hands in horrified surprise. Fitzgerald snorted. Mr. M'Bein wheeled around, gazed at his wife, and then seeing Adams, rushed up to him and exclaimed:—

"What do you mean, sir?"

"Why, my dear sir, I—"

"You what?"

"I didn't know she was anything to you. Didn't know she was anything to anybody. Thought she was—was wax, you know. Thought—look out, don't put your hands on me. I am a detective, I am. Say, if you choke me I'll pull you. I—"

He shoved the infuriated husband away. Fitzgerald snorted. An officer came and arrested Adams, but after an explanation he was suffered to depart.

"Colonel," said Adams, addressing Fitzgerald, "I am going home. I'll be dinged if I stay in a town where women are wax one minute and indignant flesh and blood the next. If women want to retain my respect they must be either wax or flesh all the time. I never could stand deceit. I'm going home."

THE TICKET COLLECTOR.

The men who take tickets have no feelings. They are hired for that reason. Yesterday a motherly-looking old lady was waiting for the train to come in from Preston. She had asked the gatekeeper ten or twelve times if the train would be sure to come in, and he answered her each time with a curt "Yes'm," when she thought she'd melt him. Going close up, she asked—

"Young man, have you an old mother?"

"Yes'm," he replied, as he reached out his hand to take a ticket.

"She does not live here?"

"No'm."

"You are her favourite son?"

"Yes. Take the first train to the left, sir."

"Once in a while you go home on a visit?"

"Yes'm."

"Your mother knows you are coming on a certain train, and she is at the station to meet you and clasp you in her arms?"

"Yes'm. Yes, there is a night train for the North."

"I have a son coming on this train—my favourite—whom I have not seen for five years."

"Yes'm. All passenger trains stop at Waterloo, sir."

"I want to be first to meet and greet him, and therefore—"

"Yes'm. Next train for Southport in about half an hour."

"And I therefore ask permission to pass the gates."

"Yes'm. Show your ticket."

"But I haven't any. I just want to meet my son."

"Yes'm. Please stand aside. Take the train on the right for Ormskirk."

"And you won't let me?"

"Show your tickets, please, and don't come so fast."

"See here, sir," she said, after she had been bumped and banged by satchels, and grips, and hatboxes, "you are no gentleman."

"Yes'm. What's wanted?"

"I want to go inside the gate to meet my son who is coming from Preston."

"Yes'm. Train got in twenty minutes ago—third track to the left. Get your tickets ready."

⁂

A SINGULAR COMMOTION.

The waves at one of the London opera houses on a recent occasion were so unsuccessfully worked that at times they recalled a story told by Poole, the dramatist, of an occurrence at one of the theatres. The sea was made of loose painted canvas, and two sets of boys—one short and the other tall—were employed to stoop and rise alternately beneath the canvas, and thus to give the idea of waves. One night the ocean was in a singular commotion, and all the waves seemed to be in the middle of the stage; fearful noises were also heard. The affrighted lessee rushed behind the scenes to seek an explanation, and was told by his stage manager, "It's all right now, sir; the eighteenpenny waves were giving the shilling waves a licking."

⁂

WHAT'S IN A NAME?

A puddler went the other day to get his child christened. "What name," asked the parson, "shall I call the child?" "Thoo can caal the kid owt thoo likes," says the father. "Well," says the parson, "I think Benjamin is a very nice name." "Vary weel," says the father, "caal it Benjamin." The puddler came out of the church with his wife and child, highly delighted with the name, when a thought struck him. Rushing back into the church, and overtaking the parson walking down the aisle, he exclaimed, "Hey, mister, the young squeaker's a lass." The parson was at a loss what to do under the circumstances. However, he put in an *a* at the end of the name, and they call the child Benjamina.

Poetry.

A FOOT-PLATE HERO.

The gradient is one in sixty where the line from the tunnel bends,
It's a bad enough place in the daytime when the light assistance lends,
But much worse still at night-time, especially winter nights,
When a fog hangs low on the cutting, and just as you've sighted lights,
You put them out, or they put you out, its a matter for chance or pace,
No wonder drivers were one in calling it a desperate place.
Railways were rather new then, and paid too little per cent.,
For a very willing ear to be to drivers' troubles lent,
So that twisting decline from the tunnel a many to glory sent.
The press would take it up now, and we'd have an inspector around,
To lunch with the manager, and come in a special to see the ground.
He'd see it was remedied, though, and in double quick time as well,
Had there been an inspector in those days I'd scarce have a story to tell.

* * * * *

Driver Lane was the first on the list, drove excellent time per mile,
Used little coal, wasted no steam, and thought it was worth his while,
To give his fireman a wrinkle or two, the consequence was they were
Known on their own and other lines as a not to be equalled pair.
Driver Lane and his fireman were comrades many a year,
Such confidence each had in his friend, both were devoid of fear,
They agreed in most things, more closely in none, than in hating the steep incline,
But knowing redress was a hopeless chance they wer'n't the men to whine,
As day after day they ran the place without a hope of amend,
They thought of the pitcher that went to the well, and its rather unpleasant end.
"Sam," said Lane to his fireman, "I'm married three years to-day,
We'll have a blow-out this evening, and finish the night at the play;
Sue and I won't be happy without you, I promised the missus you'd come,
We'll have to be back to the minute, or Sue'll imagine there's some
Collision or anything dreadful occurs to her terrified soul,
So we must come back at top speed," said Lane, "and perhaps," said Sam, "not whole.
It's a murky night, the incline must be run at half speed, not more;
It's better alive and late, thinks I, than early and home on a door."
"Bosh!" says Lane, "there's moon to-night, it'll be over the trees in an hour."
Though the moon did not rise the wind took its place, bringing a heavy shower.
Over bridges, under bridges, over meadows, between high walls,
Full speed went the train; dark grew the night, while the wind in fitful squalls,
Blew sheets of rain in the driver's face, till he scarcely knew the road,
While the moon from behind dull banks of clouds, never an instant showed.
Moaning, the wind through the tunnel comes gathering greater force,
As the train dives into the tunnel and on in her furious course.
See the moving lights! a block on the line! steady! down with the brakes!
Too late! sooner stem an ocean, and the driver's figure shakes.
See the engine-light, we're just down upon them! suddenly Sam's head bowed.
"As three years to-day," says the driver, speaking his thoughts aloud.
"Jump," said the fireman, "quickly into the bushes, Lane;
They will break your fall, let you off with a bruise or a sprain.
Remember your wife, man! your wedding-day! jump while you may,"
And catching him, suddenly flung him amongst the bushes along the way.
The look in his eyes was noble, as he faced the danger in front,
His feet were firm on the fire-plate, unflinching he bore the brunt.

* * * * *

When Driver Lane aroused from his shock, and saw before him the crash,
Life a flash came his thoughts, and springing down, found his hero amongst the smash.
Just a flicker of light like a falling spark glimmered across that face,
As Lane in his arms took the man like a child out of that death-strewn place.
"I saved her, I saved her"—the light went out, and "her" was a puzzle to Lane,

Until the next day they found on his breast a battered brass locket and chain,
With a twist of hair of a colour he knew, and the story was plain to him then,
A story kept silent beside him for years,
They were rivals—yet friends—those men.—*Slide-bar.*

WHERE TO GO.

Grave mourners should to Cyprus go,
Florists to Botany Bay;
And spinsters to the Isle of Man
Forthwith should sail away.

Bird fanciers to Canary Isles;
Musicians all to Fife,
Cape Horn, and Concord; bachelors
To Bride's Bay for a wife.

To Friendly Isle should Quakers go,
Astronomers to Skye;
Farmers to Cowes and Milky Way,
And husbandmen to Rye.

Let editors to Preston go,
And writers to Penzance;
Compositors St. Colomb seek,
And Glen Tilt each free lance.

Balloonists into Ayr should go,
Swimmers to Cork and Bath,
Skaters to Iceland, Friesland too,
And scolders to Cape Wrath.

Fishmongers should to Finland go,
And druggists to Cayenne;
All cross-grained wives to Tartary,
And shoeblacks to Japan.

Let grocers to Valencia go,
And jewellers to Troy;
Drapers to Ulster, tailors all
(For "cabbage") to Savoy.

To Wigan, barbers, and North Pole
Should go; and mutes to Bury;
While all red-hot Salvationists
Ought to New Zealand hurry.

Picnicers to the Sandwich Isles,
Confectioners to Kandi,
Tea-dealers to the Congo State,
And builders to Cape Sandy.

To Assumption cheeky swells should go,
To Flint all misers skinny;
All monarchs to the Faroe Isles,
All bankers to New Guinea.

At Stonehenge sculptors should be grouped,
Artists at Paignton be;
Rum-topers throng to Jamaica's shore,
Or go upon the Spree.

Chandlers to Greece and Wick should go,
And children all to Brest;
Landlords to Malta and Rum Isle;
In Beds all sluggards rest.

Cold hearted folks to Berne should hie,
And fiery folks to Chili;
To Trinity Land should haste divines,
Obstructives all to Scilly.

THE LAST SEPARATION

We shall not rest together, love,
When death has wrench'd my heart from thine;
The sun may smile thy grave above
When clouds are dark on mine.
I know not why—since in the tomb
No instinct fires the silent heart—
And yet it seems a thought of gloom
That we should ever part;
That journeying through the toilsome past
Thus hand in hand, and side by side,
The rest we reach, should at the last
The weary ones divide;
That the same breezes should not sigh
The self-same funeral boughs among,
Nor o'er one grave at daybreak die
The nightbird's lonely song.
A foolish thought: for WE are not
The things that rest beneath the sod,
The very shapes we were forgot
When near the smile of God.
A foolish thought—yet human, too;
For love is not the soul's alone,
It winds around the *form* we woo,
The *mortal* we have known—
The eyes that speak such tender truth,
The lips that every care assuage,
The hand that thrills the heart in youth,
And smooths the couch of age.

* * * * *

'Tis through the form the soul we love;
And hence the thought will chill the heart,
That though our souls may meet above,
Our forms shall rest apart.

Lord Lytton.

Correspondence.

NOTICE TO CORRESPONDENTS.

We do not hold ourselves responsible for the opinions expressed by Correspondents.

We reserve to ourselves the right to publish or reject any correspondence.

Rejected correspondence will not be returned unless accompanied by a stamped envelope.

All correspondence to be written on one side of the paper only.

We shall be glad to receive articles of interest and information on Railway Work, Machinery, &c. (English or Foreign), interesting Stories of Railway experiences, information of accidents, or any subject of general interest.

All correspondence to be addressed to MR. T. G. SUNTER, General Secretary, 17, Mill Hill Chambers, Leeds.

To the Editor of the Associated Society of Locomotive Engineers and Firemen's Journal.

AMALGAMATION WITH THE OLD SOCIETY.

Sir,—To those who are so anxious for the amalgamation of the old and new Societies, I would ask them, first, their objects? I suppose they are to put the old Society on a similar basis to the new one. Assuming such to be the case, I would remind them that in any event the members of the old Society would have to be balloted for their votes, *pro* and *con*. I also ask them to compare the composition of the two Societies, and I think it will be found that whilst the Associated have made overtures to them, and are nearly to a man in favour of the amalgamation, the old Society members are composed of various factions, some who are no doubt in favour of combination, but others who have offered us a determined resistance—for what reason I am at a loss to know, as we only seek the combination from a desire to see the condition of enginemen and firemen improved, and not from a mercenary motive; and I am of opinion that the Associated members must keep on expounding and advocating its principles until the opposing element of the old Society are enabled to perceive that we are established upon a firm basis, and in harmony with the requirements of the times, whilst their's falls far short of them. That being accomplished, there will be little difficulty in bringing about the amalgamation, as the question of finance could easily be equitably adjusted.

Yours fraternally,

J. H., Manchester.

* * *

LIFE OF THE OLDEST RAILWAY MAN LIVING.

When we look round upon the present perfect system of railways, the fact can hardly be realised that the Liverpool and Manchester line wes only opened in 1830, and that in 1829 it was a question whether the locomotive engine should be employed or not. Neither can it at first sight appear possible that such perfection can have been attained in the short period which is in the memory of living man.

There lives in Leicester to-day an old railway man named Thomas West Smith, more familiarly known to his numerous friends as "Old Tom Smith," who can, it is believed, claim the distinction of being the only man now living who actually worked traffic on a railway fifty-six years ago. A representative of the press considered the chance of conversing with an intelligent man who could give such interesting recollections and details of the changes he has witnessed, was a chance not to be missed. Mr. Smith has therefore been, as the Americans would say, "interviewed," and in a journey over the old line he has pointed out the various places where interesting events occurred.

Mr. Smith was born at Braybrooke, in Northamptonshire, on the 7th October, 1808; consequently, he will now have attained the age of 80. He began his railway career in his twenty-third year, by becoming a "porter" at the West Bridge station at the opening of the Leicester and Swannington Railway, on the 17th July, 1832; and in January, 1533, the company, having increased its stock of engines, he was promoted to the locomotive department. The first engine he cleaned and fired was the "Comet," built by Stephenson, of Newcastle, and shipped by sea to Hull, and thence by canal to Leicester, her first driver being Robert Weatherburn. The tender did not arrive for some two or three months afterwards, and the supply of water was for the time being carried in a large cask on a coal waggon. Mr. Smith gives very full details of all the other locomotives, which were the "Phœnix," "Samson," "Goliath," "Hercules," "Ajax," "Atlas," and "Vulcan," all of which at various times he was engaged upon, either as cleaner, fireman, or driver. He also mentions with pride the runs made when Mr. George Stephenson and Mr. Robert Stephenson rode upon his engine, or, as Mr. Smith says, "Old George and young Robert, as we us't to call them."

The signals were of a primitive description, consisting of a pole with a pulley at the top, and the rule was to "go ahead" unless a red flag was flying or a red lamp shown from the top.

The engines in those days had no "whistles," so the drivers were provided with bugles, which they tootled whenever they felt inclined, and when they were coming to a station or crossing, and if that failed to attract attention, they adopted the simple plan of raising the safety-valve lever. However, on one occasion a cart crossed the railway close to the "Stag and Castle" Inn, Thornton, and a train ran into it. After that, Mr. Smith tells us, "We had a whistle. It was a kind of steam trumpet." And when the engines were first run at night, it caused the greatest consternation.

The old Ratby Station, which still stands upon the left side of the railway, has a history which is interesting. It is a brick building, probably about 10 feet by 12 feet. It served for weighing machine office, station master's office, and passengers' waiting-room; but, most strange of all, it was an old licensed public house. The station-master, in addition to all his other duties, was an innkeeper, and, as Mr. Smith remarks, "they wouldn't allow that sort of thing now."

There were no guards' vans in those days. Goods guards had to ride upon the waggons; and when they wanted to stop, they had to run along the tops, and apply the brakes, which they did with a kind of brake stick, which, Mr. Smith says, was known as a "sprigger."

The early engines had loose eccentrics on the axles, and the levers on the footplate were in constant motion backwards and forwards, and care had to be taken to avoid getting some smart raps from them. In 1838, Mr. Smith went from West Bridge to take charge of a contractor's locomotive, the "Etna," working at the construction of that portion of the Midland Counties Railway between Trent and Rugby.

When the Midland Counties line was opened throughout, on 1st July, 1840, "Old Tom Smith" became one of that company's drivers, being stationed at Derby and working to Rugby and to Nottingham. When the Midland Counties—Birmingham and Derby—and North Midland Companies, in 1844, became amalgamated into the present Midland Railway, Mr. Smith was taken over with the rolling-stock and other property, and became a driver under the new company, and worked trains to Rugby, Leeds, Hunslet Lane, Hampton, Birmingham (Lawley Street); also to Lincoln when that extension was opened.

In the spring of 1848, Mr. Smith was sent to Southwell to open and work a new branch. The passenger traffic, after about twelve months, was found not to pay, and locomotive working was given up, a horse being employed to draw a carriage. Mr. Smith returned once again to the West Bridge, Leicester, in March, 1849, to work two passenger trains a day to Burton and back with engine No. 51, and in August of the same year the line from Desford to Leicester was opened. He then ran for many years with engines Nos. 41-45 and 190 between Leicester, Peterborough, Burton, and Derby. On a modest estimate, it is probable that Mr. Smith must have ridden on the footplate as fireman and driver some 2,000,000 miles, or say eighty-five times round the world, and in all this long journey he had not met with any accident. However, on one occasion, when running to Kettering with a special train, he found the distant signal at Kibworth "all right," but on sighting the "home" signal it was at "danger." Being without the modern continuous brakes, his only hope was to "reverse his engine (No. 190) and put steam against her." The catch flew out, and the lever dashed forward, crushing "Old Tom" between it and the weather-board. He was laid up for some weeks and never drove on the main line again. The Company placed him in charge of a stationary engine, working the coal stage at Leicester, and here he was of considerable use in moving engines, or doing a bit of shunting in the locomotive sidings up till 1886, when, after fifty-five years' work, he retired, thinking, as he says, "that he had done about enough railway work."

Mr. Smith, it is pleasing to know, enjoys excellent health. He is as active and vigorous as most men of sixty. He maintains, and, we think, with considerable reason, that engine-driving is a healthy occupation, and it will no doubt interest our readers to know that he has just become an honorary member of the Associated Society of Engineers and Firemen.

◆

RAILWAY WORKING AT HEXTHORPE.

Mr. Clement E. Stretton, Consulting Engineer to the Associated Society, reports to Mr. T. G. Sunter, General Secretary, as follows:—

Dear Sir,—I beg to report that I made a careful examination of the arrangements introduced by the Manchester, Sheffield, and Lincolnshire Railway Company for working the Doncaster race traffic.

I found new temporary signal-boxes erected at Kilner's siding, at Hexthorpe, and at Cherry Tree. The line has been entirely re-signalled and provided with the necessary fixed signals. I watched the working of the trains at Hexthorpe throughout nearly the whole of the day corresponding with that upon which the accident occurred last year. The traffic was worked without trouble or delay upon the block system, and without the use of hand signals.

The practical working fully confirmed all that we urged at the time of the trial in favour of block working, and against its suspension.

When watching the working of the traffic this year, I could not help thinking that, had the present improvements been carried out twelve months ago, there would have been no Hexthorpe disaster.

Although the Company has made progress in the signalling, I am not able to report much progress with regard to the "brake." An examination of the trains showed that a large number were fitted with the same old dangerous Smith's vacuum, which failed with such disastrous consequences a year ago.

I am, Sir,
Yours truly,
Clement E. Stretton.

◆

THE ORIGIN OF THE RAILWAY GAUGE.

Sir,—"Why did railway companies adopt a gauge of four feet eight-and-a-half inches?" is a question which is very frequently asked by those who enter the railway service. At various times some very absurd ideas have been propounded to try to account for that which at first sight may appear like "an odd half inch."

To place the matter clearly before our members, the annexed diagram has been prepared by me from the early records—

About the year 1630, Mr. Beaumont, at Newcastle-upon-Tyne, introduced the "wooden way" (shown Fig. 1), which consisted of wooden planks nailed upon wooden cross-sleepers, the width outside, or including the two planks, was five feet. This width was adopted in order that the coal carts of that period could be run on the track.

In the year 1767, at Colebrookdale Ironworks, cast-iron plate rails were introduced (Fig. 2), having an upright ledge or flange on the inner side to keep the wheels upon the track. These plate rails were

Fig. 1

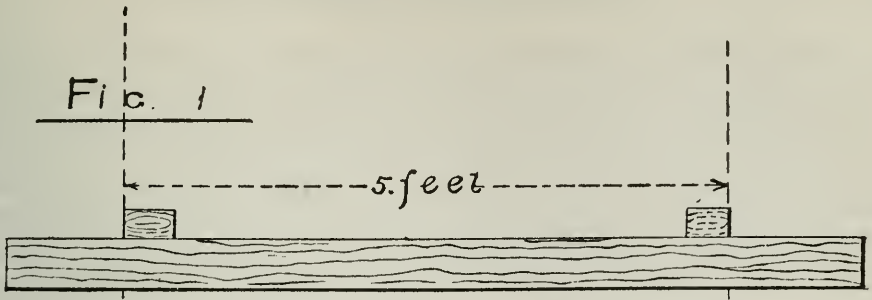


Fig. 2.

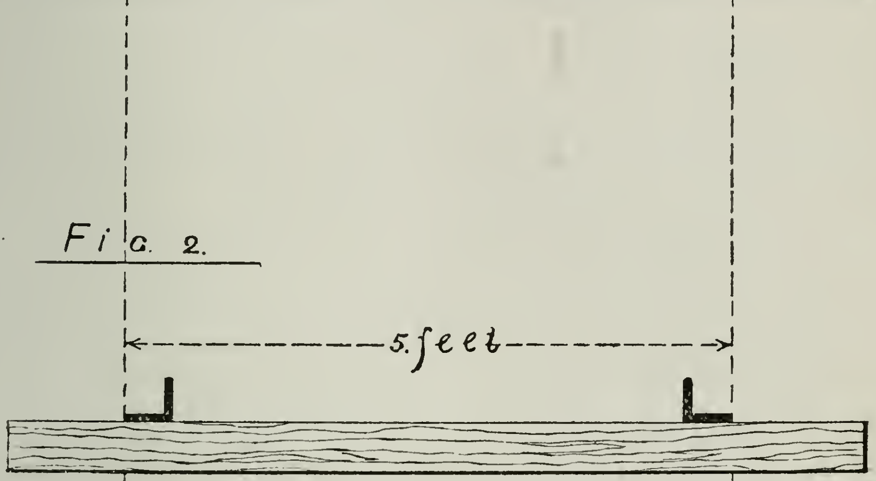
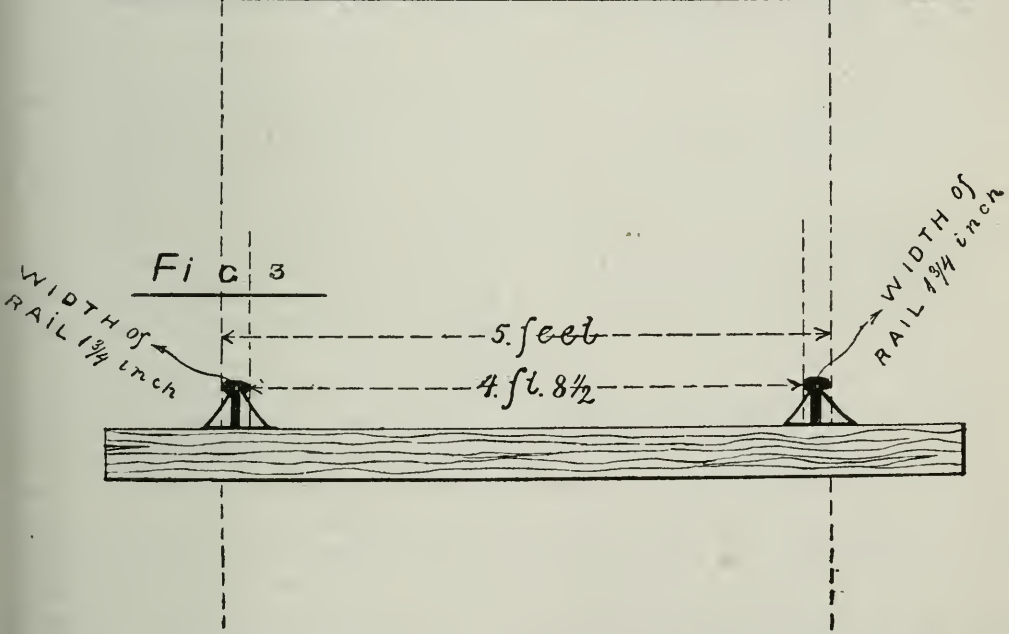


Fig. 3



also laid at a width outside of five feet.

In 1789, Mr. William Jessop, when constructing a railroad at Loughborough, in Leicestershire, abandoned the flat wheels and flanged rails, and introduced the "edge rail" (shown Fig. 3) and flanged wheels. Jessop, it will be observed from the diagram, still adhered to the gauge of five feet outside, and as his rails were made one and three-quarter inch wide, it will be seen that the width of two rails, or three and a half inches, deducted from the five feet outside measurement, leaves the present four feet eight and a half inch gauge, thus:—

Width of line outside	5 ft. 0 in.
Width of two rails (1¾ in. each)	0 ,, 3½ ,,
Leaving width between the rails	4 ,, 8½ ,,

It has been considered by some persons that Mr. George Stephenson was the *originator* of the gauge, but it will be seen that the 4 ft. 8½ in. gauge was actually in use 99 years ago, and long before Stephenson became an engineer; consequently, it is unfair to blame him, as some have done, for "making an odd half-inch."

Many years *after* Jessop's Loughborough line (Fig. 3), when Mr. George Stephenson became engineer for the construction of the Stockton and Darlington Railway, he saw no reason to alter from the gauge which he found previously in use; he, therefore, adopted four feet eight and a half inches for that line, and also for the Liverpool and Manchester, and when consulted as to the gauge for the Canterbury and Whitstable, and for the Leicester and Swannington Railways, he replied, "Make them of the same width; though they may be a long way apart now, depend upon it they will be joined together some day."

I am, Sir,
Yours faithfully,
Clement E. Stretton, C.E.,
Consulting Engineer to the Associated Society of Enginemen and Firemen.
40, Saxe-Coburg Street, Leicester.

◆

THE END OF THE RAILWAY RACE.

Sir,—The absurd railway race of 1888 came to an end on Friday, 31st August, but it should be recorded that upon that day the East Coast express leaving King's Cross at 10 a.m. beat all the previous records by arriving at Edinburgh at 5.27 p.m., or in 7 hours 27 minutes, being no less than 18 minutes before time. On the 1st September, by arrangement between the North-Western and Great Northern Companies, the special racing expresses were discontinued both from Euston and King's Cross, and the ordinary Scotch express trains which have during the racing had to start at 10.3 now start at 10 o'clock, and arrive at Edinburgh in 8½ hours by both routes, which is certainly very good work. Railways, it must be remembered, are constructed for the public convenience and to pay a dividend to the shareholders, and were never intended simply to be turned into "racecourses"; more especially as the racing increases the risk, as explained in my letter which appeared in your last issue, and also that it does not pay. Punctuality is much more important, and is more highly appreciated by the general public, than excessive booked speed, which cannot always be maintained.

In my previous letter I pointed out that the limit of locomotive speed was practically attained 40 years ago, the following extract from the official timing of a broad-gauge Great Western train will therefore be read with interest:—"Great Western Railway, May 11, 1848, Bristol express, Paddington to Didcot, distance 53¼ miles, time of running from start to stop, 47 minutes—which is an average throughout of 68 miles an hour. The engine was named 'Great Britain,' cylinders 18 by 24, 8ft. wheel. Driver, J. Almond, fireman, R. Denham; broad gauge, 7ft.; load, four carriages and a van." Your readers will be perfectly well aware that an average speed of 68 miles an hour has not been attained by any trains in the present race.

Considering the actual dangers, and also the possible risks of being committed for trial, engine-drivers may well feel thankful that the "racing" is at an end; but, nevertheless, in the interests of the members of our Society, it is important to consider carefully what might have been the result to a driver had any fatal accident occurred.

It is, I consider, my duty to direct your special attention to the important fact that the engine-drivers received no written nor printed instructions to run at a greater pace than that at which they were booked, and the verbal suggestions did not exactly amount to a distinct order—consisting only of remarks such as "Push along, driver," "Make the best of your road for Edinburgh," "Show the other people what we can do," etc. Your readers will at once see that such strong hints are not distinct authority to "race," but they amounted to the same thing, but without relieving the driver from any responsibility.

It is a fact that in the railway companies' working time-tables there is not a train booked to cover any part of a journey at a greater speed than 60 miles an hour. Consequently, it follows that whenever a greater pace than 60 miles an hour is, or has to be, attained, it must be entirely at the driver's own risk and upon his sole responsibility. Suppose for a moment that any fatal accident had occurred with one of the racing trains, we can well imagine how the company's solicitor would produce Rule No. 270, which says:—"The engine-driver must regulate the running of his engine as accurately as practicable, according to the working time-table, so as to avoid extreme speed." We can also fully understand how a coroner and jury would have dwelt upon the circumstance that the train was being run some ten or twenty minutes before the booked time, and that whereas it was timed at a speed of say 59 or 60 miles an hour, the driver was going perhaps 75 miles an hour. It can well be imagined, in such a case, a jury coming to the conclusion that the driver, by his reckless running, had been the cause of the fatal accident, and that he ought to be committed for manslaughter. In the same way, when a driver passes over a junction or a curve at a speed higher than that stated in the company's speed orders, he has to take the sole responsibility for anything that may happen. A judge would soon tell a prisoner that his duty was to work strictly to the company's time-table and regulations, and that suggestions to "push along" gave him no authority to disregard such printed regulations.

Another objectionable feature was the introduction by passengers of a considerable amount of betting with regard to speed, time of arrival, or the least number of seconds in which a mile could be covered.

In conclusion, I think nothing can prove the absurdity of the whole racing more than the fact that it has been given up—and for all practical purposes, what use has it been? It has not assisted in any scientific discovery, it has not proved anything previously unknown, and, moreover, it has been a loss to the shareholders.

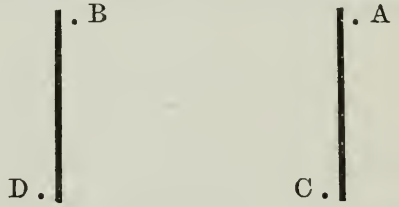
I am, Sir,
Yours truly,
Clement E. Stretton, C.E.

ANSWER TO QUERIES.

Query No. 1, July issue.

Beats of the engine.—There are four beats for one revolution of the driving-wheel, or the crank axle. In a coupled engine, fitted with a right-hand crank leading, in which the right-hand big end is straight up against the bottom of the boiler, when the left-hand big end is straight out against the fire box, observe the motion of the outside crank, as above, from the left-hand side. We shall hear the beats in the following order:—

LH cylinder, back beat B. RH cylinder, back beat A.
LH cylinder, front beat D. RH cylinder, front beat C.



The dot and letter A.B.C.D. represent the position of the crank when an engine is exhausting. W.S.

King's Cross Branch.

QUERIES.

Would any of your Ambulance members answer me the following questions, which have taken place recently, but no one there knew how to act?

1. In case a fireman should fall from the tender and fracture some of his ribs, how should I know that such was the case, and what would be the best thing to do under the circumstances?

2. If a driver should slip from his engine and break a leg below the knee, how should

I know that such was the case, and the best means of preventing further injury?

And oblige yours,
ANXIOUS ONE.

Having heard some drivers say that they can stop their trains quicker by skidding the wheels of their tenders, whilst others speak to the contrary; will some of your readers kindly give their opinions on the subject.

And oblige, Yours truly,
DON'T KNOW.

Society News.

MEETING OF ENGINEMEN AND FIREMEN AT LIVERPOOL AND BIRKENHEAD.

In continuation of the series of meetings now being held at the large railway centres, the Associated Society of Locomotive Enginemen and Firemen met at the Concert Hall, Lord Nelson Street, Liverpool, on the 23rd inst., representatives being present from the North-Western, Midland, Cheshire Lines, Great Western, Lancashire and Yorkshire, and Mersey Tunnel Railways.

Mr. Clement E. Stretton, the Society's Consulting Engineer, occupied the Chair and delivered a lecture on "Locomotives and Locomotive Working," dealing very fully with the questions of special interest to the Members of the Society. As the driver and fireman who twelve months ago were implicated in the Hexthorpe accident were Liverpool men, the details of the large diagram were examined with great interest.

Mr. Stretton then pointed out the difference in the working last year and this, and reported that—On behalf of the Associated Society it became his duty to go to Hexthorpe to see the arrangements made this year to conduct the traffic. He found new temporary signal-boxes erected at Kilner's siding at Hexthorpe, and at Cherry Tree the line has been entirely re-signalled and provided with the necessary fixed signals. The heavy race traffic was worked without trouble or delay upon the block system, and without the use of hand signals. As he watched the working of the trains at Hexthorpe, he could not help thinking that had the improvements been carried out twelve months ago, there would have been no Hexthorpe disaster. It was, however, to be regretted that the company has still to use the inefficient non-automatic brake.

Mr. Stretton gave details of his examination of the line at Hornsey, upon the Great Northern Railway, in which case the train had run over a "dead end" instead of out on to the main line, and the driver had lost his life.

The actual cause was that the driver mistook the signals, but the true reason of such mistake was that the Railway Company had, in his opinion, very unwisely removed the rings from the signal-arms of the goods-line signals. From his examination he could well see how the mistake was made; in fact, the removal of the rings formed a complete trap for any man who was at all strange to the road.

Attention was next directed to cases of engine-drivers and firemen who are killed by coming in contact with bridges when having to go up on the tenders to see the quantity of water in the tank, and the opinion was expressed that some gauge or indicator should be introduced to save the risk. Having spoken on various other matters relating to brakes, speed, testing of eyesight, and the necessity for all passenger trains being fitted with communication cords, Mr. Stretton resumed his seat amid applause.

Mr. T. Ball, the Assistant Secretary of of the Society, then gave an interesting address upon the Society, its objects and benefits. He pointed out that locomotive work is both a dangerous and an important occupation, and one which is and can only be fully understood by those railway men who work on the foot plate. It had been urged by some that all grades of railway men should join one general Society. The idea had been tried, but it had failed; it failed simply because the men of the other grades did not know the requirements of the locomotive men. What was wanted and what they now had was "a Society of locomotive men, for locomotive men, and managed by locomotive men." By all means other grades should combine as they choose, but enginemen and firemen desired to manage their own business, in a Society of their own.

Mr. Ball had great pleasure in saying that never before had their Society "gone ahead" as it was doing at the present time. New branches were being opened, and new members were coming in fast. They were establishing ambulance classes to teach their members how to render first aid to their fellow-men. They were about to start an Orphan Fund, and they were starting meetings, at which the members could debate and consider matters, and he hoped that would be of use, especially to the younger members. Mr. Ball greatly interested his hearers for a space of 70 minutes.

The following resolutions were then moved, and seconded by various speakers, and were all unanimously carried :—

1. "That this special meeting having heard the objects and benefits of the Society, pledges itself to support the same, and calls on those non-members present to join its ranks for their mutual benefit."

2. "That attention be directed to the danger of enginemen and firemen having to go to the tops of tenders when running, to see the state of the water in the tank, and that it would be a great advantage and save risk if the companies would fit their tenders with some efficient form of water gauge."

3. "That the system of testing the eyesight of enginemen and firemen by means of 'dots and coloured wool' was not a satisfactory test, and the companies be urged to adopt a practical test to be made with the actual signals at various distances."

4. "That this meeting strongly protests against the racing of trains, and especially against running before time, and urges the companies not to engage in such useless racing in future."

5. "That long hours of duty are a great cause of accidents, and that this meeting urges the companies to reduce the time on duty at any one stretch to ten hours, or as near to that limit as possible, and that the Board of Trade be asked to show all the hours worked in their next 'return' from eighteen to thirty, instead of as now simply in a lump as eighteen and upwards."

6. "That this meeting strongly urges the companies to adopt one uniform code of signals and lights ; also that, where there are other running lines besides the main lines, the signals for such extra lines should be distinguished by a ring or other special mark on the arm."

7. "That, in the opinion of this Society, it is not safe for *any* passenger train to run without proper communication between passengers and the servants in charge, and that Parliament be asked to alter the law, which now allows trains to run for 20 miles without communication."

It was moved by a Midland driver, seconded by an M. S. & L. driver, and supported by others, "That this meeting of enginemen and firemen views with great satisfaction the introduction of the *Railway Herald* as an impartial and useful railway paper; that it considers the insurance of £25 a great boon to railway servants, and wishes the paper every success." Nor was this simply passed as a matter of form, for nearly all those present gave in their names to become subscribers, and some earnest workers undertook to have a parcel of the *Herald* and supply their mates.

Votes of thanks to Mr. Stretton, Mr. Ball, and Mr. Bennett, brought the meeting to a close, and those gentlemen then proceeded to Birkenhead, where a highly successful meeting took place and addresses were delivered.

Replying to a vote of thanks, Mr. Stretton said railway servants in general must not have an impression that because he was an officer of a locomotive society, he took no interest in the other grades in the service. He always had tried to do his best to assist *any* railway servant when in trouble, from a station-master downwards. True, he was not an officer of a society for the other grades, but that was not a matter over which he had any control. In proof of this he read them an extract from the letter of the secretary of another association in which that gentleman wrote:—

"I am perfectly well aware that it was not your wish to resign the position of Engineer to the Amalgamated Society, but only that of Vice-President, and I told the Committee so."

Speaking for himself, Mr. Stretton said he never could see why the two Societies should not work together upon friendly terms, each, of course, keeping to its own sphere of usefulness.

Mr. Ball, in replying to a vote of thanks, informed the meeting amid applause that the oldest locomotive man living—Mr. Thomas Smith, of Leicester—(whose life we publish in this *Journal*) had, at the age of 80, just become an honorary member of the Associated Society of Enginemen and Firemen.

The above two meetings resulted in a large increase in membership.

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PONTYPOOL BRANCH,
September, 1888.

DEAR SIR,

I am pleased to inform you that we are making progress, having enrolled three new members since I last wrote you, and I hope to be able to report six others after our next meeting. I am also pleased to see the good our Organising Secretary, Mr. Ball, has done by opening the question of ambulance work for enginemen and firemen; for I find, when perusing our journal, that it has been the means of questions being asked in reference to that good work. And I can further say that we have members of this branch who take a great interest in ambulance work, and I hope the time is not far distant when each of our branches will have its ambulance class, so that our men may be in a position to render assistance to their injured comrades.

I remain,
Yours fraternally,
SECRETARY.

CHESTER BRANCH,
Sept. 14*th*, 1888.

SIR,—Just a line or two letting you know how we are progressing. We have not been established as a branch long, but things seem very favourable, as last Sunday night we admitted four new members, and we have got four more for next meeting night, and if we can only go on at this rate, we shall soon have a very good branch, for I think that most of the enginemen and firemen at Chester cannot fail to see the necessity of an organisation of their own, and I have good hopes for the future now that a branch has been established.

I remain,
Yours truly,
T. PRESTON.

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LLANELLY BRANCH,
September, 1888.

DEAR SIR,—A special meeting of enginemen and firemen was held at Mr. Hawbrey's Coffee Tavern, New Dock, Llanelly, on Sunday, September 23rd, 1888. Mr. F. Rus was unanimously voted to the chair, supported by a large number of friends from Swansea and Carmarthen. I regret to say we did not have so good a meeting as we expected to have, owing to there being five specials out. We had some stirring addresses, and made one new member. We are making arrangements for a special meeting, when we shall ask our esteemed friend, the Organizing Secretary, to be present, when we shall show you we are not all asleep here.

F.R.

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TONDU BRANCH,
Sept. 28*th*, 1888.

DEAR SIR,—I must apologise for not replying sooner, but as our quarter night was on the 23rd inst., and I was anticipating being enabled to forward a good report after that meeting, and I am pleased to say that I was not deceived, as we have now a branch of 56 members, and I have good reason to think we shall have some more next meeting. I require some more rule books, and I also believe I shall dispose of all the emblems in the next quarter.

I remain, yours fraternally,
R. MILL.

SPECIAL MEETING AT MEXBORO'.

A mass meeting of enginemen and firemen was held at the South Yorkshire Hotel, Mexboro', under the auspices of the A. S. L. E. & F., on Sunday, 30th September. The branch chairman presiding, who, after his opening remarks, called upon Mr. Ball, organizing secretary, to address the meeting, who, although personally unknown to most present, his name was well known to all in connection with the reports that have from time appeared in our *Journal* of the work he has been enabled to accomplish as organizing secretary, and he was accorded a hearty reception, after which he delivered a most stirring address upon the objects and benefits of the Society, the need of such an organization, its use and progress, and prospects for the future. He also clearly demonstrated how enginemen and firemen as a class could be successful in having their own Society and managing their own affairs, and dealt with the reforms he considered were necessary for their improvment, and which he felt sure would only be obtained by themselves in becoming enrolled under our banner, and not by relying upon outside assistance, the spirit of Trade Unionism being far more prevalent amongst enginemen and firemen than in other grades of the service. He also pleased his hearers in his remarks upon the Hexthorpe disaster, which occurred only a few miles from here. As he clearly established the claims of our Society in reference to the acquital of Taylor and Davis, at the same time allowing the A. S. R. S. their moiety, and had the Amalgamated Society been content with taking their portion of credit, and allowing us ours, they would have been in better odour at Mexbro', for by the visit of Mr. Ball some of the most sceptical ones have been convinced of the truthfulness of his remarks, and that our Society has a legitimate claim to a large share of the honour in obtaining the men's release. He also referred to the proposed Orphan Fund, which was having the attention of the branches, and which would receive the earnest consideration of the delegates when they next met. At the conclusion of his address, which lasted nearly eighty minutes, he resumed his seat amid applause, and I feel certain that much good will result from his visit, all present being highly gratified. We had promises from non-members to join us, and the members received a stimulus they will not lose for some time to come, also the wish expressed that Mr. Ball would again soon visit us.

I remain, yours truly,
A. F.

BRANCH MEETING HOUSES.

SHEFFIELD.
Albion Inn, Johnson Street, Wicker.
Alternate Sundays.

PONTYPOOL.
Hanbury Hotel, Griffiths Town, Newport, Mon.

NEATH.
Three Cranes Inn, Wind Street, Neath.
Alternate Sundays, at 7.30 p.m.

LEEDS.
Prince of Wales Hotel, Mill Hill.
Last Monday in month, at 11.0 a.m.

LIVERPOOL.
American Tavern, Byrles Street, Toxteth Park. Held fortnightly.

BRADFORD.
Granby Hotel, Union Street, Bradford.
First Sunday in month.

LLANELLY.
Neptune Hotel, New Dock, Llanelly.

SANDHILLS.
Brown Cow, Walton-on-the-Hill.
Alternate Sundays.

SWANSEA.
Monthly—Landore Coffee Tavern.
Saturday, at 8.30 p.m.
Quarterly—Oram's Coffee Tavern, Wind Street, Swansea.

NOTTINGHAM.
Mission Room, Queen's Walk, Nottingham. Every Monday at 8 p.m.

Bristol.
Phœnix Hotel, Totterdown. Every fourth Sunday at 7 p.m.

Plymouth.
At Mr. Sleeman's, 31, Harwell Street. Last Sunday in Quarter at 6.30 p.m.

York.
Adelphi Hotel, Railway Street, York. Alternate Sundays at 8 p.m.

Paddington.
Builders' Arms, Westbourne Park, London. Every third Sunday.

Newport.
New Bridge Inn, Bridge Street. Alternate Sundays, from May 6th.

Bow.
City Arms, Devons Road, Bromley. Fortnightly, on Fridays.

Openshaw.
Drovers' Arms, Ashton Road, Openshaw. Alternate Sundays at 7.30 p.m.

Mexborough.
South Yorkshire Hotel, Mexborough. Last Sunday in the month at 7.0 p.m.

Stockport.
Nicholson's Arms, Lancashire Hill. Last Sunday in the month at 6.30 p.m.

Birmingham.
Small Heath Hotel, Coventry Road. Alternate Sundays.

Battersea.
The Two Brothers, New Road, Battersea, London.

Retford.
Oddfellows' Arms, London Road, South Retford. Monthly at 8 p.m.

Lincoln.
Arcade Coffee Tavern, Lincoln. Last Sunday in the month.

Stratford.
Railway Inn, Angel Place, Stratford, London.

Wolverhampton.
Gladstone Inn, North Road, Wolverhampton. Meetings held monthly.

Grimsby.
Friendly Society Hall, Lower Spring Street. Alternate Sundays at 10 a.m.

Birkenhead.
Borough Hotel, Birkenhead. Meetings alternate Sundays.

Reading.
Blagrave Arms, Blagrave Road, Reading. Meetings Monthly, at 8 p.m.

Blackburn.
Dolphin Hotel, Blackburn.

Peterborough.
Pavilion Hotel, Park Road.

Stourbridge.
At Mr. Barnetts, The Mitre Hotel, Stourbridge. Monthly, Sundays.

Manchester.
Tower Hotel, Cathedral Yard. Every alternate Sunday at 7.0 p.m.

Tondu.
Llynvi Arms, Tondu, South Wales.

King's Cross.
The City of London Hotel, York Road, Cattle Market, London. Meeting nights for year—August 12th, Sep. 2nd, Sep. 23rd, Oct. 7th, Nov. 4th, Dec. 2nd, Dec. 16th.

Cardiff.
Great Western Coffee Tavern. Last Sunday in the month, at 3.0 p.m.

Chester.
Mrs. E. Cooper's Ermine Hotel. Every alternate Sunday after September 9th, at 7.30 p.m.

Exeter.
New Market Inn, Goldsmith Street, Exeter.

Branch Secretaries will oblige by sending us the time and place of their Meeting Houses.

LIST OF BRANCHES.

We have now branches at the following places:—

Sheffield
Neath
Plymouth
Exeter
Oxford
Toton
Lincoln
Liverpool
Retford
Gloucester
Llanelly
Mexborough
Nottingham
Newport
Pontypool
Cardiff
Swansea
Skipton
Grimsby
York
Peterboro'
Bradford
Openshaw
Stockport
Leeds
Sandhills
Wolverh'ton
Bristol
Carnforth
Birmingham

LONDON BRANCHES.

Paddington
Kentish Town
Bow
Battersea
King's Cross
Stratford

BRANCHES OPENED THIS YEAR.

Reading
Manchester
Tondu
Birkenhead
Blackburn
Chester
Stourbridge
Worcester

LOCOMOTIVE ENGINEERS AND FIREMEN'S
Monthly Journal.

"This that they call Organization of Labour is the universal vital problem of the world. It is the problem of the whole future for all who will in future pretend to govern men."—THOMAS CARLYLE.

"I know no better definition of the rights of man:—Thou shalt not steal; Thou shalt not be stolen from; what a society were that—PLATO'S REPUBLIC, MORE'S UTOPIA, *mere emblems of it! Give every man what is his—the accurate price of what he has done and been—no more shall any complain, neither shall the earth suffer any more."*—THOMAS CARLYLE.

VOL. 1. NOVEMBER, 1888. No. 10.

STORY OF A DRUM.

TRAMP! Tramp! Tramp!

Rang on the evening air. "And you think she'll pull thro', yer honour." "Yes, I think she'll do now, if you mind my instructions for——'

Tramp! tramp! tramp! tramp!

"What's that?"

"Oh, glory be to God! yer honour, it's a poor deserter."

I looked, and saw the information was only too true; and as I walked on with the straggling crowd I noticed the culprit was but a youth. I sighed as I watched the poor lad marching in the midst of his captors, his head drooping, his eyes downcast, no trace of emotion could be seen through the cloud of sullen gloom that gathered on his pallid face; he uttered no word, but walked steadily on as if in a deep trance.

Lamp after lamp started into sudden life. Noisy children followed, leaving their game of hide-and-seek; up-grown people gazed with pitying wonder, and the same question started to almost every lip, "What has he done?"

Beside the poor lad's body-guard walked an aged woman — his mother. A thin shawl of faded colour, half hanging from her head and shoulders, partly concealed her straggling grey hair; her hands were clasped appealingly, as she poured forth a flood of passionate grief.

"Oh! sargent, darlin', ye won't take him from me; and him so young, and me only one! Wasn't it the last night he had to spend with his ould mother before he went to the war? Oh, why did ye ever 'list for a drummer? But it's the musical boy he always was, yer honour! Oh, surely ye'll never harm the poor darlin' for only stealing from the barracks widhout leave to see his mother, and she widhout a friend in the world, barring himself—the only tie that binds me to life! Oh! sargent, darlin', do you think they'll hurt him?" And she sobbed as if her heart would break.

The appeal on her son's behalf became more earnest and sad as the distance to the barracks rapidly lessened.

The crowd had gathered as he went along; fathers shook their heads, and many a whispered "poor thing" rose softly from their pitying hearts. Mothers pressed their infants more closely to their breasts, as if to shield them from some impending danger. A poor degraded wretch, under the influence of drink, staggered through the crowd, but as the sight met her gaze, the ribald jest died on her painted lips, and she shrank away, abashed by the sanctity of a mother's grief.

The gates were reached at last, and slowly opened; the boy glanced but once at his mother's face. But, oh, the mute agony of that one look!

Tramp! tramp!

The sentinel was passed. The gate swung heavily back, and the bolt sounded like a knell to the mother's bleeding heart. There was many a sleepless one in the barrack rooms that night, but none so wakeful as the lone form crouching beneath the shadow of those great doors like a weeping Magdalen grown old with sorrow and mourning for her soul's god.

At last the night passed away. Tramp! tramp! again. But, oh, how different the scene! The morning had dawned in all its witching light of summer glory; the shops slowly opened their eyes and stared in drowsy wonder at the crowded streets; bands set forth their richest strains, flags fluttered to and fro, kissed by the breeze, and farewell cheers rent the air as the soldiers passed along to seek the far-off battle-field.

What a wild scene of parting at the station! Friends chatting half hopefully, half sadly, of the wished-for return; others in silent groups, with hearts too full for words, hands clasped, lips pressed, eyes crushing back their tears, the son's "Good-bye, and God bless you, mother;" the husband's yearning kiss and choked farewell, all blending together as the train moves, and the band peals forth "Should auld acquaintance be forgot."

A pair of manacled hands are torn from a grey-haired mother's clasp, and a prayer is heard even by the sorrowing ones around, "God guard the widdy's only son!"

Months had passed; it was a cold December night, and there alone within the dismal sadness of her low-roofed kitchen sat the soldier boy's mother. The furrows in her face had deepened, her hair no longer grey, but white.

She had never heard from her boy, as she sat alone in her woe. All around had an air of melancholy; her faded shawl hung listlessly behind the door.

Hark! What was that? Tramp! tramp. Was it fancy? No; it comes again.

The measured footfalls stop on her very step. Oh, God! can it be? The door is opened. Quick as lightning she scans a crowd of scarlet coats. "Phil, Phil," she shrieked, and then stopped like one suddenly turned to stone as her glance fell on a strange form holding a BROKEN DRUM.

"His!" said a low voice falteringly.

She took it in her trembling hands, and wept in heart-rending silence over the relic of her dead son.

No words were needed to tell her he was dead—the pale, sad faces, the broken drum, told their story only too well.

A low sound of music from a neighbouring church broke the stillness like a solemn dirge. The voice spoke again.

"We were marching to our first engagement, the bands stirring our souls with eagerness for the strife. Phil and I were close together, when a stray shot struck him, and he fell. I marked the place, and rushed on to battle."

The voice for a moment paused, and the mother sobbed bitterly.

"Our fight was fierce, but short. All stained with blood, I hurried back to Phil, and found him dying. The poor boy's face lighted up with a gleam of joy. I raised his head upon my knee. He mutely thanked me with a grateful look, and, turning his face up to mine, he whispered, faintly, 'Comrade, if ever you get back, find my mother and tell her my fate. God bless you, comrade. Mind, say good-bye to mother, *and carry her my drum.*' We buried him by starlight in the far-off land. Our mission is over. Through storm and shipwreck, with God's help, we have brought his dying gift to you."

The crouching figure bowed her head till her lips pressed the drum, as though she were fondly kissing her dead son. The soldier stepped forward to raise her from the ground; and, as he slowly lifted her in his arms, he saw that she was dead!

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Scientific.

SOIL AND SOIL-MAKERS.

What is soil? Plants and trees, generally speaking, cannot grow without soil; animals, without exception, are nourished, directly or indirectly, from plants, so that, as regards the organic world, we seem to be pent up in a vicious circle: soil cannot be formed without organic life, and organic life pre-supposes soil. There is, however, a way of escape. The spores of certain lichens can vegetate upon a bare rock. They condense from the air gases which form the bulk of their tissues. Among their products thus obtained is oxalic acid, which gradually decomposes the rock, extracting from it those earths and alkalies which plants require as part of their structures. As centuries roll on, and generation after generation of these lowly organisms perishes, each bequeaths to its succcessors the lime, the potash, the compounds of carbon and hydrogen which it has gleaned from the rocks and the atmosphere; and thus gradually, very gradually, soil is formed. Higher members of the plant world and animals now by degrees put in an appearance, and the process of soil-making goes on at an accelerated rate.

Among the soil-makers an important, though invisible, part is played by those minute plants known collectively as microphytes. Without their aid the remains of plants and animals, unless devoured by some refuse-eating species, would simply encumber the ground, instead of being utilised for the nourishment of plants, and thus, indirectly, the food of animals. These same microscopic beings also seize upon the nitrogen of dead organic matter, and convert it into ammonia or, according to the circumstances, into nitric acid. Such nitric acid, like the oxalic acid elaborated by certain plants, assists in decomposing phosphatic minerals, rendering their phosphoric acid available as plant food. Indeed, we are only beginning to comprehend the chemical changes which these ultra-microscopic beings effect both in soils and waters.

But in the great process of soil-making other and more powerful agents are also required. It is necessary to bring the lower portions of the soil up to the surface, and expose them, in a fine state of division, to the action of the atmosphere, of rain and dew, of sunshine and frost. It is no less necessary to carry down dead animals, leaves, stalks, and, in short, refuse generally, into the lower parts of the soil, so that the gases and vapours which they give off may be absorbed, whilst the residual solid particles are well mixed up with the mineral or non-organic portion of the soil. This double task is executed by a number of animals belonging to very different classes. Foremost stand, perhaps, the earth-worms—if not from the predominating extent and value of their labours, yet from the admirable manner in which their economy has been studied by Charles Darwin. They draw down into their holes all small fragments of decomposing matter, vegetable and probably animal, which they find about. Not only so, they literally eat the soil, voiding it afterwards in a state of very fine sub-division. At the same time their holes admit air and moisture into the soil, and thus aid powerfully in bringing it into fine condition for the growth of plants. Many species of insects take a share in the same task. The so-called carrion and dung-beetles dig shafts into the earth, necessarily bringing up a quantity of soil to the surface, and convey down small dead animals, excrementitious matter, &c.; thus at once fertilising the lower regions of the soil, and preventing nuisance. The so-called "white ants," so numerous in most tropical and sub-tropical countries, are also diligent soil-makers. With clay and sand, which they fetch up from below the surface, they construct not merely their cities, but covert-ways leading to quarters where they plunder. As these structures gradually crumble away and are scattered in the form of fine dust, hundreds of thousands of tons of clay are thus yearly comminuted, mixed up with other matters, and converted into arable soil in a far more perfect manner than it could be done by either plough, harrow, or spade. Very similar work, and over a wider area, from north to south, is effected by the true ants. Professor Shaler finds that in certain sandy soils the overturnings effected by these little creatures became of geological importance. He observes that in certain sandy soils the glacial terraces and plains are covered to the depth of a foot or more with fine sand and very small pebbles, whilst lower down pebbles of a larger size occur, the intervals between them being imperfectly occupied with any material. This condition he traces to the action of ants, which likewise carry down vegetable matter into their magazines, and do not consume the whole. He estimates that the amount of matter brought to the surface often exceeds three cubic inches per square foot yearly. Thus in fifty years as much subsoil would be brought up as would cover the entire surface to the depth of an inch. In damp woodland soils and along rivers, the work is taken up by a kind of cray-fish. The same authority estimates that one cray-fish in America will bring up half a cubic foot of earth to the surface in a single season. As these creatures are found in multitudes, the total effect of their activity cannot be overlooked. Not a few mammals also share in the work of upturning, loosening, and ærating the soil. But their larger size is more than counterbalanced by their inferior numbers. Soil-forming, we thus see, is a task involving the agency of a vast variety of living beings, and its consideration cannot fail to inpress us with the importance—in many respects the paramount importance—of small things. The subject is worth the attention at once of the geologist, the naturalist, and the practical farmer and gardener.—*Scientific News.*

* * *

MAN'S LITTLE DEFENDER, THE WHITE CORPUSCLE.

"The future of preventive medicine," said Professor Ray Lankester in the fascinating lecture which he delivered recently at the London Institution, "is the history of the education of the white blood corpuscle." A corpuscle is a minute cell of protoplasm which floats in the human blood. This minute creature eats, lives, and flourishes and dies almost like a human being. "Its special function," said the lecturer, "is to eat up the poisonous element which finds its way into the blood. When a wound heals, it is because these indefatigable corpuscles have found their way to the sore, and have eaten away the injured part. When bacteria get into the system, the duty of the corpuscles is to go for them and eat them up. If they succeed, the patient recovers. If they are out of appetite, or the bacteria are too tough a morsel for them to attack, the patient dies. Sometimes, with unconscious heroism worthy of Quintius Curtius, they purify the bodies in which they live by eating up poisonous particles and then ejecting themselves, thus sacrificing their own lives. But such heroic self-immolation is not necessary if you educate your corpuscle. His education proceeds by inoculation. By accustoming your protoplasmic cell to a low diet of mildly poisonous matter, it becomes acclimatized, as it were, and is strong enough to eat up without inconvenience the germs of small-pox, which would otherwise prove fatal. It is these invaluable corpuscles which enable a confirmed arsenic eater to swallow with impunity a dose sufficient to kill six ordinary men, and Professor Lankester is of the opinion that they can be trained so as to digest the most virulent poisons and deal with a great number of diseases. What a wonderful picture is this, a kind of scientific realisation of the old Persian doctrine of the eternal feud between Ormuzd and Ahriman. In every vein of our body rages the deadly strife between the evil principle and the good, between the protoplasmic corpuscles of life and the poisonous bacteria of death. Nothing that the unreined imagination of Ariosto, or even Tasso, pictured, exceeds in wonder and in magic horror this vision of an Armageddon in our life's blood, in which fierce and vigilant knights of protoplasmic life are ever swooping down to slay and devour the Paynim soldiery of the poison germ. The battle of life is thus no mere phrase, nor is its meaning solely to be confined to the struggle for existence among highly organized and sentient beings. It begins far further back. In the infinitesimally minute world revealed by the microscope, as much as in the wide campaign of modern war, there is ceaseless war, unending strife. Struggle is the law of life. Everywhere, even in our own heart's blood, eternal vigilance, prompt resistance to hurtful intruders, ruthless destruction of evil, are the conditions of existence.

THE INVENTION OF THE TELESCOPE.

It is often said that "great oaks from little acorns grow." Little accidents sometimes lead to great discoveries and inventions, as in the case of Watt, Franklin, Galileo, Newton, and others. It was one of those lucky instances that suggested the invention of the telescope. One summer day in the year of 1608, as Hans Lippersheim, a poor optician, living in a village of Middleburgh, on the island of Walcheren, Netherlands, was at work in his shop, surrounded by his children, who were amusing themselves with the lenses lying on the table, he was suddenly interrupted by his little daughter exclaiming:

"Oh, papa! See how near the steeple comes!"

Approaching her he saw that she was looking through two lenses, one plano-concave, which she held near her eye, and the other plano-convex, which she held at arm's length. She happened to hold the lenses apart at their exact focus, thus producing the same effect as is now produced by the telescope. The father repeated the child's experiment over and over again, and as he repeated the thought suddenly dawned upon him that the child had by accident made a wonderful discovery. It only remained to place the lenses permanently at a focus in order to make the discovery of practical value. This he did by making a tube of pasteboard, and fastening the concave lens in one end and the convex in the other at the exact focus. October 22nd, 1608, Hans Lippersheim sent to his Government three telescopes, to which he gave the name of "instruments by means of which to see at a great distance." From the simple pasteboard tube with its two lenses has sprung the modern telescope with all its complicated machinery and accessories.

EFFECTS OF EARTHQUAKES ON THE LOWER ANIMALS.

In the last issue of the "Transactions of the Seismological Society of Japan," Professor Milne, the well-known student of volcanic phenomena, discusses the effects of earthquakes on animals. The records of most great earthquakes refer to the consternation of dogs, horses, cattle, and other domestic animals. Fish also are frequently affected. In the London earthquake of 1749, roach and other fish in a canal showed evident signs of confusion and fright; and sometimes after an earthquake fish rise to the surface dead and dying. During the Tokio earthquake of 1880, cats inside a house ran about trying to escape, foxes barked, and horses tried to kick down the boards confining them to their stables. There can, therefore, be no doubt that animals know something unusual and terrifying is taking place. More interesting than these are the observations shewing that animals are agitated just before an earthquake. Ponies have been known to prance about their stalls, pheasants to scream, and frogs to cease croaking suddenly a little time before a shock, as if aware of its coming. The Japanese say that moles shew their agitation by burrowing. Geese, pigs, and dogs appear more sensitive in this respect than other animals. After the great Calabrian earthquake it is said that the neighing of a horse, the braying of an ass, or the cackle of a goose was sufficient to cause the inhabitants to fly from their houses in expectation of a shock. Many birds are said to shew their uneasiness before an earthquake by hiding their heads under their wings and behaving in an unusual manner. At the time of the Calabrian shock little fish like sand eels *(cirricelli)*, which are usually buried in the sand, came to the top and were caught in multitudes. In South America certain quadrupeds, such as dogs, cats, and jerboas, are believed by the people to give warning of coming danger by their restlessness ; sometimes immense flocks of sea-birds fly inland before an earthquake, as if alarmed by the commencement of some sub-oceanic disturbance. Before the shock of 1835 in Chili all the dogs are said to have escaped from the city of Talcahuano. The explanation offered by Professor Milne of this apparent prescience is that some animals are sensitive to the small tremors which precede nearly all earthquakes. He has himself felt them some seconds before the actual earthquake came. The alarm of intelligent animals would then be the result of their own experience, which has taught them that small tremors are premonitory of movements more alarming. Signs of alarm days before an earthquake are probably accidental ; but sometimes in volcanic districts gases have emanated from the ground prior to earthquakes and have poisoned animals. In one case large numbers of fish were killed in this way in the Tiber, and at Follonica on the morning of April 6th, 1874, " the streets and roads were covered with dead rats and mice. In fact, it seemed as if it had rained rats. The only explanation of the phenomenon was that these animals had been destroyed by emanations of carbon dioxide."

*

Miscellaneous.

STRIKES:

THEIR CAUSES AND CONSEQUENCES.

Conflicts between employers and labourers came into existence with the inauguration of the wage system, and will only be determined when the wage system ceases to exist. They are not confined to a class or country, but are as universal as Christianity. That this is so is unfortunate, and can be explained in varied ways, the most common of which is, and possibly the most truthful, the greed of money getting that is inherent in the human race, which is the governing principle in the struggle for life

An Eastern journal (*Work and Wages*), discussing this question, says, in a recent article, under the caption " Money or Man :" The struggle to-day is something more than a conflict between antagonistic interests, though that enters into it. It is the liberation of moral forces that have been generating for centuries. It is a mighty striving upwards of human millions who, for the first time in the world's history, have seen visions of progress.

The uprisings of peasants and artisans in past times have been local in extent, and in their quality more rebellious against oppression and robbery. The movement to-day is world-wide, including the workers for wages of every civilized nation ; and it is a deliberately organized endeavour to raise to a higher plane of life, for the realisation of new born aspirations. Popular education has been doing its work. There is no paver on the street who has not heard that the world is not growing richer and better, and drawn the inference that he ought to have, therefore, a better home than his noisome tenements, and be able to afford to his children opportunities for social advancement.

Into such a struggle all the passions of human nature must enter.

It takes the form of a conflict because the masses perceive that, if they are to rise to a higher plane of life, they must have ampler resources ; more wealth, more leisure, and more control over the instrumentalities and conditions of production.

Realising this, and seeing enormous fortunes accumulating in a few hands, it is easy for men who are hungry in body and excited in mind to argue that the workers for wages are somehow being deprived of wealth and power that belong to them of right.

To the wealthy employer, who is conscious that he has acquired his possessions by diligence and economy, and believes that if any other man has failed to do as well, the failure has been due to personal limitations and not to any injustice, the suggestions that the accumulations of the rich on the withheld earnings of labour, sounds like a threat, and he assumes an attitude of defiance. The issue is thus early made, and unless other influences prevail it must be decided by an industrial war.

But into the struggle enters also, to modify and shape it, the larger thought of the men and women who believe that every great manifestation of social discontent has a basis of real grievance somewhere, and who insist, therefore, on looking below the surface of things to underlying laws and causes.

They have already won a respectful hearing for the propositions that there may be such actual injustice in industrial conditions over which individuals have little control, but which society as a whole is responsible for and must remedy. The willingness to admit this, and the disposition to seek remedies, implies a hopeful devotion to higher interests than material success. A century ago the allegiance of men was divided between the two ideals of military greatness and commercial supremacy. The commercial ideal triumphed, and to-day the rivalry is between money and man. If money getting for its own sake, or for the power it confers, is to continue to be the master passion, we may confidently expect that the conflict between labour and capital will intensify until it rends the social fabric. But if general interest in man and his destiny, and wiser modes of living take possession, we may reasonably hope that the upward struggle of the masses will take the form of a quite gratifying progress. Happily, there are signs on every hand that the higher ideals are winning allegiance. Even the teachers of political economy are beginning to admit that man, rather than wealth merely, is the subject of their science. As this idea gains general acceptance it must effect great changes, not only in ways of looking at things, but in conduct and policy. Business methods and political action will take on a different complication and produce very different results, when public opinion is thoroughly converted to the truth that the chief object of private endeavour and public institutions is not the accumulation of riches, but the perfection of man.

(To be continued.)

THE ORIGIN OF MAN,

AN ESSAY.

That man is indebted to divine revelation for a correct knowledge of his origin is, to my mind, quite clear, for we have the testimony of the only infallible authority on record—the Bible—that man was a new creation when he first stood forth pure and holy in the Garden of Eden; and in Genesis ii. and 7, Moses, the divinely inspired historian, gives us a detailed account concerning the origin of this masterpiece of creation, which is undoubtedly a most decided and positive statement that man was of divine origin, and created fully developed and completely organised. Dr. Adam Clarke says of the book of Genesis: "This book is the most ancient and the most authentic history in the world, a history that contains the first written discovery that God has made of Himself to mankind." "Without this history," remarks Fuller, "this world would be in comparative darkness; from its statements we learn that there was a time when the material universe did not exist, space was empty, matter had no existence, our globe and the planets, and suns we now behold in the vast profounds of space, had not been added to the great Architect's designs, but God resolved that there should be a material universe, 'He made the heavens and the earth and all that are therein.'" He resolved that there should be a sentient universe, and at His command birds appeared in the air, beasts in the field, and fishes in the flood. He resolved that there should be an intelligent universe, and man was created, and it is to the creation of man that I wish for a short time to direct your attention. Now you will be aware that there are men who are opposed to the Mosaic account of man's origin, and who would have us believe that from the first germs of organic life (which some of these theorists admit to have had a creator, while others of them deny to God even this small share in the production of animated existence), all other forms have been developed by natural processes with which the Creator has had nothing to do, and that man is the result of the last of these developments. Professor Huxley says that carbon, hydrogen, oxygen, and nitrogen, are all lifeless bodies; of these carbon and oxygen unite in certain proportions, and under certain conditions to give rise to carbonic acid ; hydrogen and oxygen produce water; nitrogen and hydrogen give rise to ammonia. These new compounds, like the elementary bodies of which they are composed, are lifeless, but when they are brought together, under certain conditions, they give rise to a still more complex body called protoplasm. This protoplasm exhibits the phenomena of life, and that the properties and chemical tendencies of compounds and elementary substances are the same now as they have been in past ages, so that if living matter has once arisen naturally and independently, we have the best possible warrant for the belief that living matter is continually coming into being by virtue of the operation of the same laws. But is it not strange that the union of four lifeless elements should produce life, when the union of two of them has no trace of any such result. Again, Mirabaud maintained that inanimate matter could pass into life, and that you had only to sprinkle a little flour, dead in itself, with water, and out of the combination of the two a living insect would spring. He maintained also, that it would not be more marvellous to produce a man independent of the ordinary means, than to produce an insect by flour and water. His idea was that they had only to gather together certain chemical substances in certain proportions, and put them into a vessel and seal it for a certain length of time, and lo, there would spring therefrom a living man. But how to reconcile such a statement with the fact that there is no property of matter better known, or more thoroughly established, than that of inertia, I am at a loss to understand.

Inertia or inactivity, writes one eminent scientist, is that property of matter by which it would always continue in the same state of rest or of motion in which it is put. It is one of the earliest and most universal results of human observation, that matter is incapable of spontaneous change. It is just equivalent to saying that mere matter is destitute of life, for spontaneous action is the only test of the living principle. When we see a mass of matter undergoing change, we never seek for that change in the body itself, but in some external cause producing it. A body cannot of itself commence to move from a state of rest independent of an external influence ; nor can it, when moving, arrest its progress without an external cause. A stone, for example, can never put itself in motion unless it be in some way or other acted upon. Some persons may be apt to imagine that living beings, such as man and other animals, form exceptions to the law of inertia, but we ought to consider that all the parts which constitute the organs and members of the living machine are in themselves mere bodies, and are subject to the same laws as all the other species and other forms of matter. They derive their power of action from the principle of animation, and not from any inherent property which exists in the several parts. Hence, when the principle of life is removed by death, voluntary action and motion no longer remain, even although no particular derangement appears to exist in the once living being, and this leads us to conclude that the principle of spontaneous and voluntary motion, in all living organised beings, is altogether different from mere matter, and is not subject to those laws by which matter is recognized and governed. It must be the action of a spiritual or immaterial principle which directs and governs the action of all organized bodies, and this spiritual agent is no other than the self-existent and eternal Jehovah. How nicely some men try to get out of their difficulty when driven into a corner by speaking of Nature. "Some of them," says Dr. Sexton, "are constantly babbling of Nature, as though by the use of a word they got rid of all difficulty in connection with this question." What is meant by Nature? According to the derivation of the word nature, it means that which is born or produced, in point of fact, the beginning. It is solely phenomenal, and consequently its cause must be sought for outside itself. That which becomes, or begins to be, cannot be the cause of itself, but must be a consequence of previous conditions. Nature, therefore, as the sum total, is an effect, and as such requires a cause; and here, again, we are driven to something beyond Nature. There can be no phenomena (and Nature consists simply of phenomena) without change, no change without motion, no motion without force, and no force without spirit, for spirit force is the only force in existence. Thus we are led by various lines of thought to the same conclusion—Nature is an effect, a phenomena, a manufactured article, in other words, a creation, and her cause and creator is God.

We now come to another gentleman who gave considerable impetus to the development theory by his treatise on the origin of species, by means of natural selection, I refer to the late Dr. Darwin, who inferred that we have all descended, not from Adam and Eve, but from a monkey, for we find him suggesting that man's ape-like ancestor began his progress towards humanity by acquiring a more upright posture and a freer use of his arms, and that by the gradual progress of the body in this direction, the present form of man was produced, and that during the progress of man's body his mind was gradually improved, as the body became more and more what it is like now, and therefore more capable of giving effect to mental conceptions. The Hon. Judge Marshall, writing upon this subject, says, "He does not think there is a word in Scripture nor a suggestion of sound reason to give the slightest countenance to the absurd opinion of a transmutation or change from any of the lower animals into man. Doubtless there are some similarities between several of the organs and members of the bodies of many of the lower creatures and those of man. The eye of the horse, of the ox, and the dog, and of many animals, is similar in structure, appearance, and use, to that of man, as well as some others of the bodily members of the animals named, but will any person of sound understanding say that because of such likeness any of these animals will in some future period be transmuted into the form of man, and become a rational being." Some of the molluscas are in shape like the moon, and very transparent too, and give a light at night; but none but a thorough idiot could suppose that they will ever become moons or other lights in the heavens, yet any suppositions or conjectures as to such transmutations or changes in horses or oxen, dogs or molluscas, are scarcely more absurdly foolish than the supposition that because some of the bones of the paw (or hand if they please) of a gorilla, or other ape, are somewhat like those in the hand of a man, or the external appearance, or the weight of the brainy matter of that animal are partially similar to those of the man, therefore man once belonged in part to a species of the apes, and by transmutation or progressive development became, in course of ages, of the order or the kind of being he is at present. We know that all the animals and creatures o the lower creation, as to their natural instincts, propensities, and various other qualities, have ever remained the same, incapable of being raised to any higher order or rank in the scale of being. The lemurs, chimpanzees, and all other apes or monkeys of the present day are just the same as they ever have been since they first came into existence, and I do not think all the development naturalists in the world could point to a single instance during the history of the earth where such a thing as the development of one race into another has taken place. Can they tell us of a case in which a plant has become an animal, or a fish a bird, or a bird a beast, or a monkey been known to develop into a man, or a man ever sunk to the level of a monkey? For if their theory be true is it not somewhat strange that they never find fossils in course of development (half ape and half man for instance). The tribes discovered by Moffat in South Central Africa were sunk very low, but they were men nevertheless, with all the latent capacities of our race undestroyed, as the result of the labours of that eminent missionary fully proved. Men cease not to be men however low they may sink, and monkeys do not become men nor manifest the least tendency to do so. Dr. Stock also states that the geological record is dead against the development theory, for says that gentleman: "Geology testifies that the earliest animals of each species were not the diminutive ones, but the gigantic, that the animal life in all its branches of the Adamite age is, as to size, puny when compared with that of earlier geological ages, and that the geological animals have not developed into anything else at all, but have passed away in succession and have been succeeded by other animals, which the Creator had produced by the direct exertion of His power, the process terminating in the new forms and species created at the time of man's introduction on the stage of our earth. Again, we know that species if closely related may sometimes be crossed and produce a degenerate intermediate race, which soon becomes extinct, but it more commonly happens that a hybrid is unfruitful, or propagates only with an individual of pure blood. Again, man has the peculiar gift of improvable reason, whilst animals are born what they are intended to remain; the extent of their capacity is limited by an impassable decree." Mr. Darwin, when speaking on this point, said that man is capable of greater and more rapid improvement than any animal, but it is due to his power of speaking and handing down his knowledge, but this is perhaps only removing the difficulty a step further back. How did man acquire language? Professor Max Müller says, the possession of language is the fundamental difference between man and brutes; and the Duke of Argyle says, the fashioning of an implement for a special purpose is another immeasurable gulf between man and brutes. Many other arguments might be adduced against the development theory, but I fear I have already trespassed too far, and conclude by saying that so far from being a developed animal, man must have been created in his normal state, in the full use of his personal faculties and productive powers. There must have been a first pair of human beings. If they were produced in an infantile state, how did they come into existence, seeing that by the supposition they had no full grown parents to produce them, and who nourished and cherished them? Man in infancy is notoriously helpless, and soon dies without a parent's care. If the first pair of human beings came into existence as infants, they must have been produced without parents, and for want of parents must soon have died. But if the first pair came into existence in full possession of all their faculties, and able to take care of themselves, they cannot have been produced by generation, for the supposition is that they were the first of their kind. Besides, human beings who are generated are never born able to take care of themselves, but are puny, helpless infants. Clearly, then, the first pair of human beings must have been produced by a process altogether different from that by which men are brought into being now. That process must have been a creation.

THOMAS BALL

Railway Items.

ACCIDENT ON THE GREAT EASTERN RAILWAY.

Major Marindin reports as to the result of his inquiry into the causes of a collision which took place on the 12th September near Whitemoor Junction, March, as follows:—

In this case a special passenger train from Doncaster to March (consisting of engine and tender, one first-class, one second-class, nine third-class, and two composite carriages, and two brake-vans), when running into March station upon the up main line at about 10.40 p.m., came into collision with a goods engine attached to seven wagons, which was on its way from March goods yard to Whitemoor goods yards on the down through line, and had been brought to a stand at the Whitemoor Junction down home signal, foul of the junction of the main lines and the through lines at March North Junction.

The leading and trailing wheels of the goods engine, and all the wheels of the passenger train engine and tender, the leading brakevan of the passenger train, and one of the wagons attached to the goods engine, were thrown off the rails. Both engines were considerably damaged, and the passenger brake-van, a third-class carriage, and one goods wagon were slightly damaged.

In the permanent way, five rails were bent, and about 40 chairs were broken.

There were only four passengers in the train, and none of these were injured, but the head guard was bruised and slightly shaken.

Through March station there are four passenger lines of rails running east and west, the up and down main lines being on the south side, or down side, of the up or down through lines.

The main line after passing through the station runs westward to Peterboro', but there is a double line leading off the main line and forming a junction with the through line at the north-west end of the station. The two junctions are worked from March North Junction cabin, which is situated between the two, and on the south side of the through lines. After this second junction the line to Spalding curves to the north towards Whitemoor Junction.

At Whitemoor there are three double junctions; first, that of a back curve from the Peterboro' line; secondly, that of a goods line into Whitemoor goods yard; and thirdly, that of the line to Wisbech. Whitemoor Junction cabin lies between these junctions on the east side of the railway, here running north.

Owing to the numerous junctions, and the sharp curves, the signals are somewhat difficult to see; while, owing to the short distance between the cabins, they overlap in rather an inconvenient manner. Thus, an engine standing at the Whitemoor junction down home-signals fouls the junction of the through line and the line leading off the main line worked from the North Junction cabin, and in this position cannot be seen from Whitemoor Junction cabin.

The only signals to which it is necessary to refer are—

First.—The station down starting signal for the down through line, which is actually one of the North Junction down home-signals. This signal stands upon the north side of the through lines, and is 183 yards east of the junction points.

Secondly.—The Whitemoor Junction down home-signals, which are upon a three-armed bracket post, on the north-east side of the line, very near to the points of the North Junction.

Thirdly. — The North Junction up-signals which form a group of four signals, standing in the angle between the loop leading from Peterboro', and the line to Spalding and the North.

The point of collision was on the crossing of the down through line, and the up line leading off the main line.

The following distances should be noted:—

From the East Junction cabin to the North Junction cabin ...	373 yds.
From North Junction cabin to Whitemoor Junction cabin ...	260 ,,
From North Junction cabin to the point of collision	84 ,,
From North Junction cabin to Whitemoor Junction down home-signal...	142 ,,
From North Junction cabin to Bridge over the line	154 ,,
From North Junction cabin to North Junction up home-signals	175 ,,

An obstruction at the point of collision could not be seen from an engine approaching from Whitemoor Junction until it was through the bridge over the line, about 70 yards distant from it; and, owing to the sharp curve, this view would be intercepted by the chimney and boiler of the engine. The lines are level. Block working is in force at all the cabins.

The collision, fortunately not a serious one, was caused by the mistake of the signalman in March North Junction cabin, who, having allowed the goods engine with seven attached wagons to pass his down through line junction home-signal, after it had been accepted from Whitemoor Junction cabin, accepted from Whitemoor Junction, and lowered his home-signal for the special train to run into the station upon the down main line side, although the goods engine was standing on the crossing of the junction, the Whitemoor Junction down-signal being at danger. In this position the engine was well within his view, being only 84 yards from him; and he admits that he forgot all about it.

The Whitemoor Junction signalman, when he accepted the goods engine and wagons had no means of knowing whether it was coming off the main or through lines, and as it would not in the former case have been foul of the junction, and as, moreover, he could not see it from his cabin, he cannot be blamed for offering to North Junction cabin the up special train.

Nor can the driver of either engine be held responsible. The driver of the goods engine did not know but that the special train was for the through line side, in which case there would have been no risk of collision, and, although there is a general rule forbidding engine-drivers to stand foul of a junction, he had, it appears, been frequently told to run well forward to the Whitemoor Junction signals, a necessity with long trains, in order to clear the East Junction, although not so in the case of short trains.

The driver of the up special train had clear signals, and could not possibly have seen the other engine until he was close upon it, so that he had no time to do anything to avert the collision.

The signalman in North Junction cabin had been on duty about 40 minutes.

This collision shews the necessity for the Whitemoor Junction signalman having some control over the junction or station starting-signal for the through line worked from the North Junction cabin, so that he may either keep it at danger until he is ready to let a train pass his home-signal, or may, at any rate, be aware of the position of such train.

I would recommend the Company to move the down through line starting-signal nearer to the junction, and to arrange for the Whitemoor Junction signalman to slot this signal. If it be necessary to provide a shunting signal for engines to draw forward past the starting-signal, to get to their trains on the Wisbech Dock line, this signal should also be slotted.

Considering the position of the signal-cabin, and the impossibility of giving as good a view of the line from it as might be wished, it would be an advantage for the signalman in Whitemoor Junction cabin to know whether a train signalled to him from North Junction cabin is approaching upon the down main or the down through line, and it would be easy to arrange for the bell signals to be distinctive.

ACCIDENTS AT DINTING JUNCTION ON THE MANCHESTER, SHEFFIELD, AND LINCOLNSHIRE RAILWAY.

The results of the inquiries made by Col. Rich, of the Board of Trade, into the circumstances attending the accidents that occurred on the 20th September and October 8th, at Dinting Junction, are as follows :

The branch railway to Glossop leaves the main line from Manchester to Sheffield at this junction. Dinting station is at the junction, and has up and down line platforms on both the main line and the branch.

The leading portion of the 7.50 a.m. passenger train from Manchester left the rails after passing through the junction points, and instead of running to the branch line platform, as the train was intended to do, it ran along, and was stopped with the near side wheels in the 6-foot of the main line, and the off side wheels in the 4-foot of the down main line.

No persons were injured.

The permanent way was damaged.

The passenger train consisted of an eight-wheel engine (the driving and trailing wheels were coupled together, and the four leading wheels were fixed in a bogie frame), a six-wheel tender, and seven passenger coaches, the first and last having brake compartments. A guard was travelling in the brake compartment of the last coach. The engine and all the vehicles of the train were fitted with the automatic vacuum-brake.

The train left Manchester and arrived at Dinting junction at the proper time, but after passing over the junction facing-points the engine and tender and two leading coaches, and the first pair of wheels of the third coach, got off the rails. The engine stopped about 220 feet from the junction points. It is impossible to say whether the engine mounted the check rail on the inside of the curve before reaching the first crossing, or whether the near side wheels got on the wrong side of the first crossing.

The permanent-way staff think the first, and the locomotive engineer thinks the last, was the cause of the accident.

The permanent-way is of a good and strong description. The main line at the junction curves to the north on a radius of 40 chains, and the branch line curves to the south on a radius of seven chains, as it leaves the junction. The seven-chain curve is provided with a check rail. There is a super-elevation of about 1½ inches on the outer rail of the curve on the main line (main line trains pass the junction and station at considerable speed), but there is no super-elevation of the outer rail of the curve on the branch. All branch trains stop at the station.

The speed of the train when it left the rails is variously estimated as having been about 5 to 8 miles an hour.

The cause of this accident appears to have been the tightness of the gauge of the rails, and of the check rail on the seven-chain curve. It has been the habit on this railway to keep the gauge about ¼ in. tight on the curve, whereas the rails and checks on the curve should be kept wide to gauge in proportion to the curve, and the rails where the curves are so sharp, and the junction does not admit of the proper super-elevation being given to the outer rail, should be fixed in a much stronger manner than the ordinary permanent way.

With reference to the accident which occurred at the same place on the 8th instant, the train was similar to the one on the 20th September, except that the engine was a six-wheel engine, the driving and trailing wheels being coupled together.

The engine, tender, and two leading coaches left the rails and took the same course as the train did on the 20th September. The engine stopped about 160 feet east of the junction points. No persons were injured. The permanent way was damaged.

I think there can be no doubt that the tightness of the gauge on the seven-chain curve caused this second accident, as well as the accident on the 20th September. The gauge of the rails and check round the seven-chain curve should be widened.

The engineer of the railway informed me that he proposed to keep the gauge wider for the future, and to ease the curve as much as the railway formation will admit of.

As there is a high viaduct at the west end of the station the junction points can only be carried a very short distance more to the west unless the viaduct is widened.

All branch trains stop at Dinting branch station, and are directed to approach it at very moderate speed.

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BRITISH AND RUSSIAN RAILWAYS.

From an official report it would appear that the total length of railways opened for traffic in Russia on the 1st of June was 25,634 versts, or 17,000 miles. Of this total, 3,213 versts were the property of the government, and 21,075 were owned by private companies; 1,129 versts were in Finland, and 217 versts (the Transcaspian line) were controlled by the minister of war. Last year about 700 miles were opened for traffic. Two railways were closed, the Sestroresk and Oboyansk, having a united distance of 24 miles. In this manner the increase of the Russian railway system is less than in any of the great English colonies—Australia, Canada, and the Cape. In Great Britain itself, containing 2,000 miles of railway more than the whole Russian empire, the communication system is almost complete, and the additions made every year are necessarily of a limited character; but India, with her 14,000 miles of line open, and a yearly addition of 1,000 or 2,000 miles, presses upon Russia closely, while at the rate Canada is progressing, that colony, with only 5,000,000 people, will in a few years surpass in railway mileage Russia with her 100,000,000 souls subject to the will of the Czar. According to a recent computation, there are 30,000 miles of railway in the fifteen principal English colonies, including India, Canada, and Australia. Adding thereto the mileage of Great Britain, we find that the British empire possesses three times the mileage of the Russian empire. In Asia alone, the mileage of India and Australia combined exceeds the mileage of Russia. This year Russia is making extraordinary efforts to make amends for the apathetic policy of the last five years, but with all her exertions she will not have constructed by the end of 1888 more railways than either Canada, the Cape, or Australia.

◆

RAILROAD GAUGES OF THE WORLD.

From a comprehensive review of the history and development of the railroad gauges of the world, the following particulars in regard to the gauges of the world are extracted. It was agreed in England about 1848 that a uniform gauge of 4 ft. 8½ in. should be used on all new roads, except those already served by 7 ft. gauge. The first German road, from Nuremberg to Fürth, was built with 4 ft. 8½ in. gauge, which is now used by all the principal roads of Germany, although there is a very considerable mileage of narrower gauges, mainly 1 metre, or 3 ft. 3⅜ in. France started her roads with a width between rail centres of 4 ft. 11 in., which has led to some slight variations of gauges, according to rail width. The later roads have been built with a gauge of 4 ft. 8⅞ in. Holland began with a 6 ft. 4 in. gauge, but has now altered all its roads to 4 ft. 8½ in. The Railroad Congress at Bern, in May, 1886, adopted the following resolution, which is to apply to Germany, Austria-Hungary, France, Italy, and Switzerland:—"The gauge of railroads measured between the inner edges of the rail heads shall, for roads built or altered as to gauge after this resolution takes effect, not be less than 4 ft. 8⅜ in. on straight lines, nor mor than 4 ft. 9⅝ in. on curves."

In Russia, the first road opened in 1832, from St. Hetersburg to Zarskoe-Selo, about 16 miles, had a 6 ft. gauge. When the second road was made in 1842, from St. Petersburg to Moscow, the Czar, at the instance of our countryman, Major Whistler, fixed the Russian gauge at 5 ft., which increase over the English gauge was thought desirable for locomotive purposes. Major Whistler thought as wide a gauge as 6 ft. uncalled for. The 5ft. gauge has continued the standard in Russia; but that it was not made different from the German gauge for military reasons seems to be proved by the fact, instanced by Herr Claus, that the lines built under imperial direction from Warsaw to Vienna, and from Warsaw to Bromburg—the Berlin line—were carried out with the German gauge.

The history of American gauges is briefly and intelligently reviewed, with reference to the narrow gauges, the author confining himself to the standard gauges.

Ireland has a standard gauge of 5 ft. 3 in.; Spain and Portugal, 5 ft. 6⅓ in.; Sweden and Norway have the 4 ft. 8½ in. gauge over the majority of their railroads, but 20 per cent. of the Swedish roads have other gauges varying from 2 ft. 7½ in. up to 4 ft.; Norway has 592 kilos of standard gauge, and 970 kilos of 3ft. 6 in. gauge.

In Asia, of the British-Indian roads, with a collective length of 12,366 miles, about 7,450 miles have a gauge of 5 ft. 5⅝ in., the remainder being divided among six gauges from 2 ft. to 4ft. Of the narrow gauges, the most prevalent, embracing 4,209 miles, is the metre, 3 ft. 3⅜ in. The Ceylon railroads have the standard Indian gauge. The Russian Trans-Caspian lines have the Russian standard gauge of 5 ft. In Asia Minor, the line Mudania Brussa has a gauge of 3 ft. 7¼ in. The island of Java has 449 miles of 3 ft. 6 in. gauge, and 126 miles with 4 ft. 8½ in.

In Japan, with the exception of an 8-mile piece begun in 1885, with a gauge of 2 ft. 9 in., all the roads have a 3 ft. 6 in. gauge.

In Africa, the Egyptian railroads, amounting to 932 miles, are of the 4 ft. 8½ in. gauge. Algiers and Tunis, with 1,203 miles, in 1884, had the 4 ft. 8½ in. standard on all except 155 miles, which had a 3 ft. 7¼ in. gauge. The English Cape Colony had, in 1885, 1,522 miles, all of 3 ft. 6 in. gauge.

In America, apart from the comparatively small mileage of United States roads with 3 ft. gauge, practically the whole of the United States and Canadian railroads are of 4 ft. 8½ in. to 4 ft. 9 in. gauge. In Mexico, in 1884, 2,083 miles were 4 ft. 8½ in. and 944 3 ft. gauge. In Brazil, at the end of 1884, there were 869 miles of 5 ft. 3 in. gauge, and 4,164 miles of various gauges between 2 ft. and 4 ft. 7 in., over 3,700 miles being 1 metre, or 3 ft. 3⅜ in., so that this may be considered the standard gauge of Brazil.

In Australia the different colonies, rather singularly, have different gauges, that of New South Wales being 4 ft. 8½ in.; Victoria, 5 ft. 3 in.; South Australia, 5 ft. 3 in. and 3 ft. 6 in.; and the other colonies 3 ft. 6 in.

The total mileage in operation in the world at the end of 1885 was 303,048 miles. Of this length seventy-four per cent. were of the 4 ft. 8½ in. to 4 ft. 9 in. standard, 12 per cent. had larger gauges, and 14 per cent. smaller.—*Glaser's Annalen.*

THE FIRST RAILWAY IN CHINA.

The first annual report of the first railway in China has been issued by the directors. The line runs from Tongsan to Yungchong, in the province of Chihli, in North China. Its length is 90 li, or about 27 miles, and it owes its existence to the Kaiping coal mines, from which a considerable portion of its revenue is derived. The gross receipts were 53,943 taels (about £13,000), and the net profits 19,606 taels (about £4,900). A dividend of 6 per cent. has been declared on the paid-up capital of a quarter of a million taels, the nominal capital being a million of taels, or £250,000; 1,166 first and 143,333 second-class passengers were carried, and the principle item of the goods traffic were 170,588 tons of coal, 81,543 tons of bricks, 15,566 packages of general mechandise, and four million pounds of lime. During the year the line had not been extended, as it is at the present time, from Yungchong to Tientsin, the commercial capital of North China, and therefore the business done during the current year cannot fail to shew an enormous increase on that of last year.

Useful Hints.

HOW TO REMOVE TATTOO MARKS AND MOLES.

Europeans, who have been foolish enough either in youth or age, to tattoo themselves like Fiji Islanders, Patagonians, or any other race of picturesque savages, may be interested to hear that Dr. Variot, of Paris, has discovered a simple, but effective, method of removing red or blue pictorial devices from the human skin. M. Variot has embodied the results of his experiments in an elaborate treatise on tattooing in ancient and modern times, which he has sent to the Paris Biological Society. Further, the doctor has experimented on prisoners in the Central Infirmary, to which he is attached, and on hospital patients, all of whom have, of course, offered themselves voluntarily for the operations. M. Variot has also tested the efficaciousness of his method, in removing black or brown beauty spots or moles from the skin of animals, and has found it eminently successful. His *modus operandi* is to prick the marks or spots with needles until the blood flows, then to inject tannin, and finally, to cauterise with nitrate of silver. Very little inconvenience is felt by the person operated upon, unless, of course, the marks extend over a large surface. The wounds caused by the pricking and cauterisation become black for a time, then turn red, and after a month or so the parts which have been treated are almost indistinguishable from the adjoining flesh.

◆

HOW TO KNOW GOOD MEAT.

Dr. Letheby lays down the following simple rules for the guidance of those in search of good meat: 1. It is neither of a a pale pink, nor of a deep purple tint. 2. It has a marked appearance from the ramification of little veins of fat among the muscles. 3. It should be firm and elastic to the touch. Bad meat is wet, sodden, and flabby, with the fat looking like jelly or wet parchment. 4. It should have little or no odour, and the odour should not be disagreeable. Diseased meat has a sickly, cadaverous smell, and sometimes a smell of physic. This is discoverable if the meat is chopped and drenched with warm water. 5. It should not shrink or waste much in cooking.

◆

DAMP BEDS.

For many people who are constantly travelling from place to place this is a subject of great consequence. Damp beds ought to be carefully avoided, for they not only produce dreadful disorders, but have often proved the death of the person who has had the misfortune to sleep in them. Especially in winter, if you are travelling, not only examine the beds to see whether they are quite dry, but have the bedclothes in your presence put before the fire. Just before you go to bed, order a pan of hot coals to be run through it, then place a clean tumbler inverted between the sheets, and let it remain there for a few minutes; if, on withdrawing it, the slightest cloud is observable on the inner surface, be certain, that either the bed or the sheets are damp. Sleeping in the blankets is disagreeable, but the safest way of escaping such danger; there are many persons in the habit of travelling who make it a constant practice.

◆

AN INFALLIBLE MEANS TO EXTINGUISH A CHIMNEY ON FIRE.

Take a handful of sulphur and throw it on the fire, when the sulphurous fumes ascend up the chimney it will immediately put out the fire in the chimney. A solution of five grains of muriate of ammonia in one gallon of water will put out any fire, whether it be a house in flames, clothes, or anything else. The above is a very valuable recipe, and is not much known, for if it were the fire brigade would adopt it immediately.

Humorous.

A LEFT-HANDED LUNG TESTER.

At a singing school the other night a young man was bragging about the strength of his lungs, and invited a girl in the company to hit him in the breast. She said she was left-handed, had been washing all day, was tired, and didn't feel very active, but at his urgent request let go at him. When his friends picked him up he said he thought he would die easier lying down. He had lost every recollection of having any lungs, but the young woman consoled him by admitting that she didn't hit him as hard as she might have done, because she rather liked him.

◆

WOLF.

There has been some "scandal" in the city of Virginia, Nevada, owing to the conduct of a young gentleman, who lately left his father's house, having exhausted his credit in the place, and who telegraphed the other day to his parent: "Your son Walter was killed in the Consolidated, Virginia, this morning by a falling cage. What shall we do with the remains?" In reply a telegraphic order was sent for one hundred and fifty dollars with the request "Bury them." The young gentleman pocketed the money, and had an elaborate spree. When in a condition for writing, he sent his father the following note: "I have just learnt that an infamous scoundrel named Barker sent you a fictitious account of my death, and swindled you out of one hundred and fifty dollars. He also borrowed eighty-five dollars from me, and left the country. I write to inform you that I am still alive, and long to see the old parental roof again. I am in somewhat reduced circumstances, the accumulation of the last five years having been lost —a disastrous stock operation—and if you would spare me two hundred dollars, I will be ever thankful for your favour. Give my love to all." A few days later the erring youth received the following dignified reply from his outraged parent: "My dear Son,—I have buried you once, and that is an end of it. I decline to have any more transactions with a corpse.— Yours in the flesh, FATHER."

◆

THE DISTRIKT SKOOL-MASTER.

By JOSH BILLINGS.

There iz one man in this basement world that I alwus look upon with mixed pheelings ov pitty and respekt.

Pitty and respekt, az a general mixtur', don't mix well.

You will find them both travelin' around amung folks, but not often growin' on the same bush.

I had rather a man hit me on the side of the head than tew pity me.

But thare iz one man in this world to whom I alwus take oph mi hat, and remain uncovered until he gets safely bi, and that iz the distrikt skoolmaster.

He leads a more lonesome and single life than an old bachelor, and a more anxious one than an old maid.

He iz remembered just about az long and affectionately az a gide bord iz by a travelling pack-pedler.

If he undertakes to make hiz skolars luv him, the chances are he will neglekt their larning.

The skool committee make him work for haff the money a bar-tender gits, and board him around the naborhood.

Enny man who has kept a distrikt skool for ten years, and boarded around the naborhood, ought to be made a major-general, and have a pension for the rest of his natral days, and a horse and wagon tew do his goin' around in.

I had rather burn a coal-pit, or keep the flys out ov a butcher's shop in the month of August than meddle with the distrikt skool bizziness.

◆

A well-known French missionary, Father Bridaine, was always poor, for the simple reason he gave away everything he had. One evening, during his wanderings, he asked for a night's lodgings of the curate of a village through which he passed, and the worthy man, having only one bed, shared it with him. At daybreak Father Bridaine rose according to custom and went to say his prayers at the neighbouring church. Returning from this sacred duty, he met a beggar, who asked him alms. "Alas, my friend, I have nothing !" said the priest, mechanically putting his hand into his breeches-pocket, where, to his astonishment, he found something hard wrapped up in paper, which he knew he had not left there. He hastily opened the paper, and seeing four crowns in it, cried out it was a miracle. He gave the money to the beggar, and hastened into the church to return thanks to God. The curate soon afterwards arrived there and Father Bridaine related the miracle with the greatest unction. The curate turned pale, put his hand in his pocket, and in an instant perceived that Father Bridaine, in getting up in the dark, had taken the wrong pair of breeches. He had thus performed a miracle with the curate's crowns.

* * *

We are told that the Siberian railway will connect Napirsk, Chita, Irkutsk, Tomsck, Tobolsk, and Ekaterineburg. We think that if these names were connected, and had a handle adjusted to the rear end, they would make a first-class meat saw.

* * *

A boy, selling newspapers at a railway station at Ely, was calling out one Saturday evening : "To-day's *Times*, gentlemen ?" Upon which a passenger attempting a witticism, cried out, what's the use of to-day's *Times ?* I'll give you a shilling for to-morrow's." The boy immediately handed him the *Sunday Times*, when the passenger refused to give him more than sixpence ; but his fellow travellers made him keep his word, and give the sharp-witted lad a shilling for a sixpenny paper.

* * *

"I told you particularly to awaken me, guard. Here I am at Rugby, and I wanted to get out at Bletchley," said a testy old gent in the express.

"Well, sir, I did try three times, but all you said was 'All right, Mary, get the youngsters their breakfasts, and I'll be down in five minutes.' So I let you sleep it off."

Poetry.

THE MARRIAGE QUESTION.

Is marriage quite a failure ?
'Tis the question of to-day—
And from a humble standpoint
I have just a word to say.

No ! marriage is no failure,
If based on love alone—
Its watch-tow'rs, Bear and Forbear,
And Truth, its corner-stone.

If each would to the other,
But patient be and kind,
Life's trial would knit closer
In one bond heart and mind.

Those small, but kind attentions,
Which *lovers* give and take,
If practised *after* marriage,
Would endless pleasures make.

If husbands would continue
To give unto the wife,
Those thoughtful loving trifles
That sweeten daily life.

And oh ! wives, if the hours
You lose in folly's fair,
Were spent in earnest striving
Your husband's work to share.

If men would but acknowledge
One law should rule the twain,
Then marriage would be holy,
Its ties fresh vigour gain.

True marriage is no failure,
No galling fetters prove ;
'Tis mutual help and comfort,
And all its links are love.

But oh ! how very often
Is love left quite outside,
And wealth the only motive,
Or wordly place or pride.

Then marriage is a failure,
For founded on a lie,
It has no chance to prosper,
And miserably must die.

HE CONQUERS WHO ENDURES.

Hopeless the task to baffle care,
Or break through sorrow's thrall!
To shake thy yoke thou may'st not dare;
It would more keenly gall.
Through life's dark maze a sunnier way
This tranquil thought insures—
To know, let Fate do what she may,
He conquers who endures!

Vengeance, for any cruel wrong,
Bringeth a dark renown;
But fadeless wreaths to him belong
Who calmly lives it down;
Who scorning every mean redress,
Each recreant art abjures,
Safe in the noble consciousness,
He conquers who endures!

Who quells a nation's wayward will
May lord it on a throne;
But he's a mightier monarch still
Who vanquisheth his own.
No frown of Fortune lays him low,
No treacherous smile allures;
King of himself, through weal or woe,
He conquers who endures!

Mark the lone rock that grandly studs
The melancholy main—
The raving winds, the foaming floods,
Burst over it in vain.
In age majestic as in youth,
It stands unchanged, secure;
Symbol immortal of the truth—
They conquer who endure!

Charles J. Dunphie.

◆

LIFE'S MINISTRIES.

It was only a blossom,
Just the merest bit of bloom,
But it brought a glimpse of summer
To the little darkened room.
It was only a glad "good morning,"
As she passed along the way;
But it spread the morning's glory
Over the livelong day.

Only a song; but the music,
Though simply pure and sweet,
Brought back to better pathways
The reckless roving feet.

"Only!" In our blind wisdom
How dare we say at all?
Since the ages alone can tell us
Which is the great or small.

◆

FORSAKEN.

BY ADAM SCHOLES.

Can we tear from our breast the heart's dearest treasure,
When deep, deep into the soul its image has burned?
The depths of our anguish no plummet can measure,
When we find that our love has been silently spurned.

Neither music nor mirth that so pleases the throng,
Can e'er fill up the void that is left in this breast,
Can the bird of the woodland rejoice in its song,
When deprived of its mate it loved fondest and best?

Then, ah me! my sad soul shall still cling to the past,
For it never again can be joyous or gay.
If the love I so prized had continued to last
Then life would have seemed but one bright summer day.

I'll try to forget that I ever have known thee,
Though the task will prove fruitless, futile, and vain,
For, oh! in the depths of my soul I adore thee,
And though my idol is gone, fond memories remain.

Aye, memory is all I have left me to cherish
Of the joys that have flown nevermore to return,
The sunlight of hope from my soul has to perish
As, forsaken and lonely, in silence I mourn.

Detroit, Mich.

THY DUTY.

Let all the good thou doest, man,
A gift be, not a debt;
And he will more remember thee
The more thou dost forget.
Do it as one who knows it not,
But rather like a vine,
That year by year brings forth its grapes,
And cares not for the wine!
A horse when he has run his race,
A dog, when tracked the game,
A bee when it hath honey made—
Do not their deeds proclaim.

UNKNOWN.

"Unknown," did you say in your jargon,
In scattering broadcast the tale
Of how a poor boy had been slaughtered,
That bleak winter's night on the rail?
Had you paused but the briefest of moments,
And heard the poor boy's dying groan,
As he whispered the name of his mother,
You'd never have styled him "unknown."

"A man," not at all, you're mistaken,
In years he was only a boy;
Full of vim, full of life, full of frolic,
A mother's delight and her joy.
In her dreams on that night she embraced him,
And fancied he stood by her side,
In the strength and the bloom of his boyhood,
Her features aglow with her pride.

Very soon came the terrible story,
Of death, sudden, silently, sure.
Now her dreams are distorted forever,
Her heart has a load to endure.
'Twas a terrible, gloomy transition
To heartrending grief from the joy
Which she had in her dreams, as she worshipped
Her youthful and light-hearted boy.

There she sits in her grief, like Niobe,
Disconsolate, desolate, sad;
Every throb of her heart brings reminders
Of filial acts in the lad.
There she sits in her anguish despairing,
Her sighs would bring tears from a stone,
As she broods in the deepest distraction,
Her heartstrings twined round the "unknown."

Correspondence.

NOTICE TO CORRESPONDENTS.

We do not hold ourselves responsible for the opinions expressed by Correspondents.

We reserve to ourselves the right to publish or reject any correspondence.

Rejected correspondence will not be returned unless accompanied by a stamped envelope.

All correspondence to be written on one side of the paper only.

We shall be glad to receive articles of interest and information on Railway Work, Machinery, &c. (English or Foreign), interesting Stories of Railway experiences, information of accidents, or any subject of general interest.

All correspondence to be addressed to MR. T. G. SUNTER, General Secretary, 17, Mill Hill Chambers, Leeds.

To the Editor of the Associated Society of Locomotive Engineers and Firemen's Journal.

FATAL RAILWAY ACCIDENT IN CHILI.

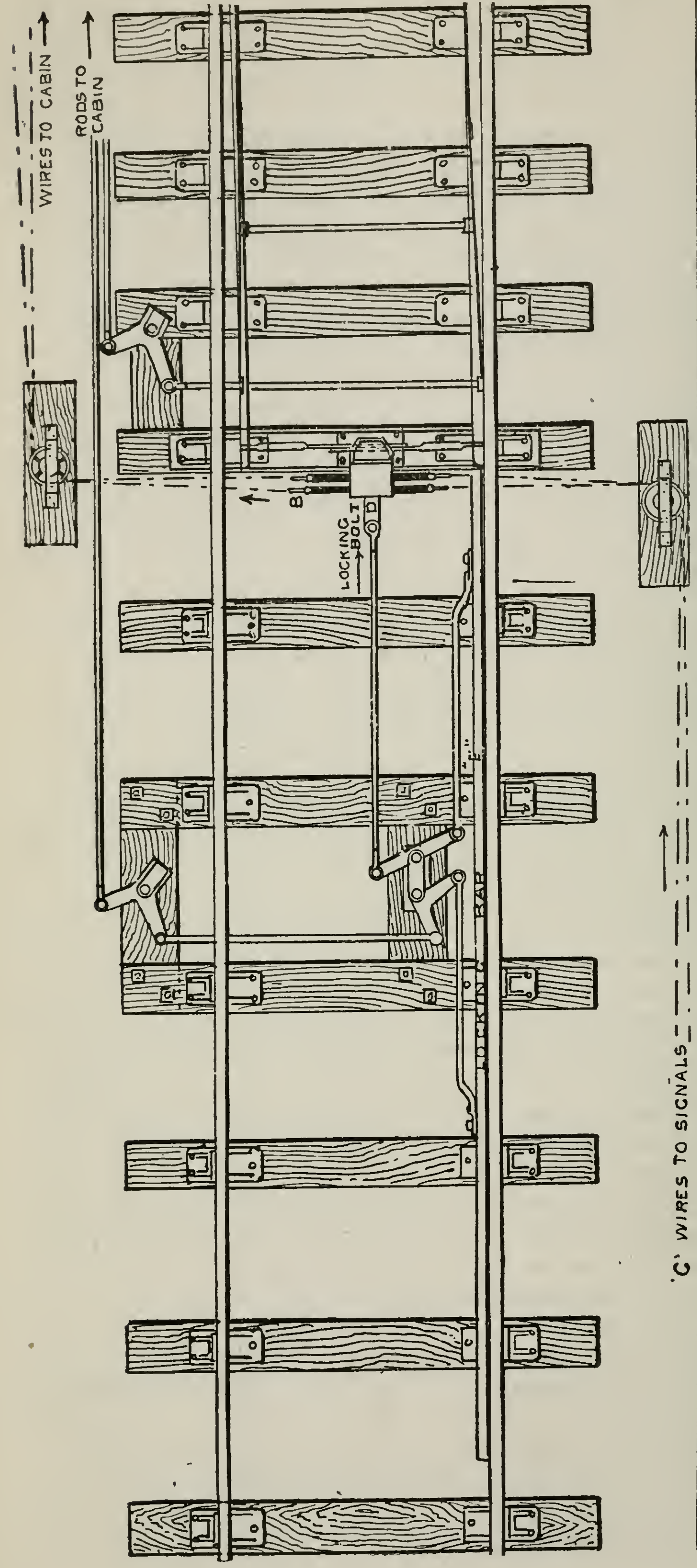
SANTIAGO, CHILI, *August* 19*th*, 1888.

Dear Sir,—It is with a heavy heart that I recount the tale of an accident by which one of our brother members lost his life, on Monday, August 6th. The scene of the accident was a portion of the line, about 30 miles north of Santiago, known as the San Ramon Grade, where the track goes round the foot of a mountain called San Ramon. The line emerges from a stone cutting into a sort of valley, about three-quarters of a mile long, and entirely surrounded by mountains, and taking a sharp curve, and with a rising grade of about 1 in 60, enters another stone cutting on the north side. On the western side of the track, and running parallel with it, at a depth of about 16 feet, is a mountain stream, which in the summer time may be crossed by stepping-stones. In the rainy season this stream swells to considerable proportions, and the incessant rains of the past fortnight had converted it into a boiling torrent, rushing onward at a speed of 14 or 15 miles an hour, and carrying everything along that came in its course. This stream, after a long straight course down the mountain side, and being fed by other streams, struck with terrific force on the inside curve of the railway embankment. The water was nearly on a level with the rails, and although the road appeared all right on the surface, the irresistible flood had done its work below by undermining the track. Gerald Blackwell, one of our most respected brothers that came out here from Nottingham, was working the 6.30 p.m. freight from Santiago to Valparaiso, and had taken up a pilot engine at Batuco, Gerald's being the leading engine. They proceeded in the usual manner until they reached the treacherous spot, when both engines simply turned right over into the 16 feet of boiling surf below, Blackwell and mate and the native driver of the pilot engine being carried along with them. The native fireman of the second engine and a cleaner, who was riding with them, managed to save themselves by jumping. Four cars followed the engines into the water, and the fifth, with seven brakesmen inside, hung endways up over the edge of the embankment, but the brakesmen escaped without injury. The remarkable thing about it is that the up express had passed over the spot in safety, in the opposite direction, only twenty minutes previously. The express was cautioned over the place, but it is a question of very grave doubt if the flagman was at his post to caution the freight train, and there are no Board of Trade inquiries in this country. The body of Blackwell was recovered the following Saturday, August 11th, about five miles down the river, but nothing has been seen as yet of either Blackwell's fireman or the native driver. I visited the spot on August 8th, and there saw a sight I shall never forget. No. 48 was in the bed of the river, wheels uppermost, and only part of the R.H. engine wheels and one big end visible, and the water breaking over her like a sea. Her tender was entirely upside down, and I just got a glimpse of the flanges o the tender wheels. The pilot engine was entirely out of sight, and, I believe, remains so still, and the tender of the pilot engine has been smashed by the fury of the torrent since the accident, and parts of it are washed to a great distance. After the water had subsided sufficiently to make an examination of Blackwell's engine possible, one of the drivers got on to her, and found the L.H. injector, steam and water cocks, both open, the regulator open, and the lever in the fourth notch from the centre, thus shewing that the poor fellows were hurled into eternity without a moment's warning. As soon as Crump and I learned that Blackwell's body had been recovered, we took steps to have it removed to Santiago, and on Monday, August 13th, just a week after the sad occurrence, his body was laid to rest in the Santiago Protestant Cemetery. Brothers Wiggs, Crump, and myself, and Mr. J. Radford, late of Toton, along with 24 other Englishmen, including Mr. Grant, the running-shed foreman at Santiago, and enginemen and mechanics were present at the graveside. The Rev. Mr. Allis, the Protestant minister at Santiago, performed the solemn ceremony, and, in a very touching and appropriate discourse, pointed out the necessity for everyone, and especially railway men, setting their houses in order, for we know not either the day or the hour when the Son of Man cometh. Poor Gerald was of a genial and generous disposition, that drew every one to him with whom he came in contact, and his removal from our midst has made a gap in a circle of friends that it will take a long time to fill up. Grieved that my first epistle to our valuable *Journal* should be of such a sorrowful nature, and wishing the Society and *Journal* God speed,—I remain, yours fraternally,

JAMES HARPER,
Santiago, Chili,
Late of Nottingham.

* * *

RAILWAY SIGNALS.



Sir,—Several inquiries have recently been made in railway circles with reference to the Kirby point lock, I therefore trust the following details and annexed diagram will make the construction clear to your readers.

The invention consists of a new description of facing point-lock, which at once detects and makes known to the signal-man any defect which may exist in, or breakage of, the rods of his locking apparatus. The locking slides, B, of the facing points are attached to and form part of the wires, C, running from the signal-box to the signals. It therefore follows that unless the points be placed in the proper position the signals cannot be lowered. It is important to notice that the locking bolt, D, receives its motion from the locking bar, E; therefore, if the bar should, in consequence of a broken rod or the failure of a joint, not move as required, the locking bolt prevents the signals from being lowered for any direction except the one for which the points are actually placed and locked.

Yours faithfully,
Clement E. Stretton.
Leicester, 26th October.

* * *

THE CONTINUOUS BRAKES RETURN.

The following report upon the Board of Trade Return relating to the use of continuous brakes has been made by Mr. Clement E. Stretton, consulting engineer, to Mr. T. G. Sunter, general secretary.

[Copy.]

Dear Sir,—I have carefully examined the continuous brakes return for the first half of the year 1888, which has recently been issued by the Board of Trade. The information given clearly proves that the so-called battle of the brakes has resolved itself into the general adoption of the Westinghouse automatic, or the automatic vacuum brakes—and the fitting of rolling-stock intended for exchange traffic, with both these brakes complete.

For your information I have drawn up the following summary, showing the amount of stock fitted and unfitted on the 30th June, 1888 :—

	Engines.	Vehicles.
Total stock returned as fitted with brakes complying with the conditions of the Board of Trade ...	3,072	28,063
Total fitted with brakes' which do not comply	1,506	11,728
Total fitted with continuous brakes	4,578	39,791
Total fitted only with apparatus for working brakes, or with pipes or chains	3,839	7,912
Total not fitted with either brakes, apparatus, pipes, or chains	567	4,853
Total rolling-stock, therefore	8,984	52,556

It will therefore be seen from these figures that out of a total of 8,984 engines and 52,556 carriages, &c., only 3,072 engines and 28,063 vehicles have brakes which even profess to fulfil the Board of Trade conditions, and from my examination of some of the brakes I find that a number of vehicles which the companies return as "complying," do not really do so.

Turning to that part of the return which relates to failures, it appears that no case has occurred during the half-year, under class No. 1—that is, "failure or partial failure to act when required in case of an accident to a train, or a collision between trains being imminent."

Under class 2, "failure or partial failure to act under ordinary circumstances to stop a train when required," I find no less than 49 cases. This total is made up as follows :—

Vacuum, automatic	4	cases
Vacuum, simple	37	,,
Total, vacuum brakes...	41	,,
Westinghouse	7	,,
Chain brake	1	,,
Total	49	,,

It will be remembered that on the 17th March a serious failure of the automatic vacuum brake occurred on the London and North-Western Railway, when "the 8.20 p.m. train, Euston to Holyhead, overshot the platform at Rugby." The report states that it was owing to the vacuum brake failing to act, but that the "cause could not be ascertained."

These frequent cases which "cannot be ascertained" appear to require consideration, for they shew how easily the most careful engine-driver may be lead into a trap by his brake failing.

With regard to delays, class 3, a large number of cases are recorded.

The best record of working of automatic brakes is undoubtedly that given by the London, Brighton, and South Coast Company, upon which line 328 engines ran 3,192,601 miles with the Westinghouse brake, with but seven cases of delay, and these amounted to a total of only 27 minutes. It is to be hoped that the Board of Trade will in future publish a summary of failures, shewing at a glance the number of cases under each of the three headings. For, as a matter of fact, the class to which a case belongs is the most important point—but at present, to ascertain this information it is necessary to wade through very many pages of the Return.

I am, sir, your truly,
Clement E. Stretton.

To Mr. T. G. Sunter,
General Secretary,
Associated Society of
Engineers and Firemen.

AMALGAMATION WITH E. AND F. SICK BENEFIT SOCIETY.

Sir,—I see in your last issue a letter from "J. H., Manchester," on the above subject, and although friend J. H. answers his own questions, yet, if you will allow me, I will try and give the history of the formation of the Society. In 1878 the enginemen and firemen on a certain line were threatened with a serious reduction of their wages and increase in the hours of working. Having appealed to their Board of Directors, between whom and the men negotiations were pending for a considerable time, during which time the men were not idle. The Society was first considered as a local help for this one line, when some of the men thought it would be wise to extend it to all enginemen, as up to this enginemen had no Trades Union. I will not go through the details of the opposition from selfishness and other causes; sufficient is it that the Society has proved a benefit to many thousands, directly and indirectly, and to individuals whom it has protected, its aid has been priceless. The men who drew up the rules of the A.S.L.E.& F., were actuated simply by one motive, "The Welfare of their Fellowmen," knowing that in course of time the "Old Society," as it is called, would be forced to amalgamate or become bankrupt. It is no use disguising the matter, we know that the Old Society is not getting the young members in the same numbers as before the inauguration of the new Society, our rules are drawn up in accordance with Old Society. I have now before me a circular, signed an "Old Engineer," which I have had some years, asking the question "why there should be two Societies?" in which the writer says:—"*A river fed from one spring and divided into two streams* is not as powerful as if confined to one course." I would pursue the simile further, and say that if you make the one course deeper and wider, so that you take all or nearly all the water from the other stream, that in a short time the water course will dry up the vegetation within and the once promising place will become a desert. I will make one further extract from the circular referred to. The writer says—"I ask you enginemen of the United Kingdom to 'amalgamate your two Societies' in the interest of the members of both Societies, so that you may be a power in the country and have a word in the engagements which you enter into with your employers, and to take your place amongst the other skilled labourers and artizans of your native land. It is only simply a matter of detail for the E.C. of both societies to establish the basis of an agreement, giving the members of either Society, up to a certain age, liberty to join both by paying the ordinary subscriptions into both if they so choose, and giving the members of the E. & F. Friendly Society, who are over the age agreed upon for full benefits, the option of paying into the Trades Union if they choose to do so; if not, let them only receive the benefits for which they pay, but make it imperative on all new members to join both funds, in other words, to pay one shilling per week, receiving the benefits which are now given by the A.S.L.E. & F. Society. By doing so you at once become a power to do good. As I think the latter Society is more in accordance with the spirit of the present age, there will be none of that contention between the two bodies of men in getting the young men to join their respective Societies. These should be no desire to interfere with existing rights, but build up a Society that will be a security to yourselves and your children; if your officials will not take the matter up, you yourselves should do so and tell them you are not going to let your welfare wait on red tape. I will not weary you by pointing the many great acts of injustice you could put an end to at once by such amalgamation, or the advantages of all being joined in such a Society, but ask each man to consider, 'are we doing right to have two Societies?' Is the E. & F. Friendly Society able to afford me any protection in the event of a trades dispute? Are we increasing in numbers in the same ratio since the foundation of the so-called New Society? If not, why not? Will the amalgamation be of any benefit to me and my comrades?" Having made this lengthy extract, will you allow me to say if the E. C. of the A.S.L.E. & F. Society would make an offer to the members of the Old Society, on those lines or something approaching it, what they would consider fair for their members, it would clear the ground a good deal. I or any single member, pointing out a line for them to follow, would seem presumptuous, but I take it that all members have the welfare of their fellows at heart, which is my only excuse for occupying so much of your valuable space.

I am, sir, your obedient servant,
An Old Engineman.

Sir,—In perusing our society journals I have of late noticed that at several of the meetings held in connection with the various branches of our Society, there have been resolutions passed that those present viewed with satisfaction the introduction of the *Railway Herald* as a useful and impartial railway paper, but strange to relate, I have never yet read of a resolution being passed in reference to our *Journal*. That the *Railway Herald* may be a useful paper to some, I don't attempt to deny, but I have yet to learn that it has ever advanced anything calculated to benefit us as Trades Unionists. And I for one should like to hear of our valuable little *Journal* being brought to the front at our meetings, and hear a little less of the *Railway Herald*, for I believe in charity beginning at home, and it will be quite soon enough to push other people's goods when we have none of our own to sell. Hoping that some other members will express their opinion,

I remain, yours fraternally,
A Lover of the "Journal."

Swansea Branch,
October 29th, 1888.

Sir,—Hearing that our Organising Secretary was to pay visits to Carmarthen to endeavour to open a branch, and to Llanelly, for the purpose of strengthening the branch, a number of the Swansea members decided to accompany Mr. Ball to these places, and although several of them had been on duty all night, and the rain came down in torrents, it did not damp their ardour or prevent them from assembling in good force at Landore Station, on Sunday morning, Oct. 28th, to carry out their intentions. The first place visited was Carmarthen, where we were met by a number of the craft, and by whom we were hospitably entertained. We then wended our way to the Assembly Rooms, where we had a splendid meeting, and as we listened to Mr. Ball, who commanded the attention of his audience for upwards of an hour, whilst he in a most masterly manner expounded the many benefits accruing from Trades Unionism, and who by his forcible arguments shewed that it was a fallacy to suppose that sectional unity would not be a success so far as enginemen and firemen were concerned. We felt sure that Carmarthen would that day be added to the roll, which proved correct, as a splendid branch was afterwards opened, thus making the organisation of South Wales nearly complete. We then hurried to the station in order to catch the train for Llanelly, and here again we had a splendid meeting, Mr. Ball speaking for an hour and a quarter with no uncertain sound, and his forcible arguments, and clearly pourtrayed analogies, frequently evoked applause, and, before the meeting closed, seven enginemen and firemen had given in their names for membership. Brother Millman, and others, rendered admirable service at both meetings, and, as we journeyed homeward, we felt that we had been amply repaid for our sacrifice, for it is not often that enginemen and firemen, in this part of the country, have an opportunity of hearing two such addresses in one day, by a man who has served his apprenticeship on a locomotive footplate, as those delivered by Mr. Ball on the occasions that I have named, and it is the prevailing opinion in this part, that we have the right man in the right place. And now I would say to our members who are working at stations where they have not a branch established, do all you possibly can to get one. You might begin by speaking to the men individually, and try to arouse their interest in our cause, and if you can obtain the names of a number of them who are willing to join, communicate with the General Secretary, Mr. Sunter, and ask him to arrange for Mr. Ball to pay you a visit, and, by so doing, you will be helping to build up what must ultimately prove one of the strongest Trades Unions in the kingdom, and when the December of our lives shall arrive, may the thought of having been instrumental in such a grand achievement be a solace to us all.

I am, yours fraternally,
J. Lloyd,
Chairman, Swansea Branch.

Sir,—It is well for those engaged in any great undertaking to occasionally pause and review the ground they have gone over, and see what progress has been made, in order that they may know how to shape their acts for the future. In making such a retrospect of the events in our organisation, for the past twelve months, we have every reason for congratulation and satisfaction at what has been done, the ground for bright hopes and grand expectations for the welfare of the Associated in the future. Within the time named, our Organising Secretary, Mr. Ball, has opened about a dozen new branches, with unusually large numbers of new members, while from every side come words of cheer, and large additional numbers are flocking in all our branches. Never since our organisation started have we been in such a prosperous condition, and never was there a brighter outlook for the future. On every hand there appears a healthy substantial growth, with an increasing and earnest zeal, on the part of our officers and members, to enlarge and strengthen each branch, by energetic, persevering, and constant efforts to make our members better workers, and better men in every sense of the word, and more worthy of the confidence and respect of their employers, and the esteem and kind regards of their fellow associates. While we regard with proud satisfaction the successes of the past, I would exhort our brother members to abate not one jot or tittle in their ardour, but, if possible, bring still more earnestness and zeal into the hearts of every member, and let the future prove by its successes, how dear to our hearts are all manly principles and teachings. Our future must be grand and glorious if we perform our duty. There are scores of good men not yet in our ranks. Let us welcome them with hearty greetings, and teach them by our deeds, that we, doing good work in the cause of progress, and elevating our brother members to better and higher aims in life, doing all in our power to make footplate toil honourable and desirable.

"No receding, no retreating—
Every man must do his part,
While Freedom's march is beating
In the blood of every heart."

Yours fraternally,
Breechloader.
Liverpool.

REPLIES TO QUERIES.

Sir,—In reference to Cathay's reply to Query No. 4, of August issue, I think he was rather too hard upon me. It is just possible that I may not have worded my question in the most happy manner, but I suppose that Mr. Reynolds is only human the same as the rest of us. But my reason for asking the question was to get the opinion of some of our members in reference to springs breaking, packing up, &c.

I am,
Yours truly,
D. D.

Sir,—I noticed in the May number of our *Journal* that a querist asked the following question:

Supposing an engineer builds two engines with the same stroke and diameter of cylinder as each other, the slide valves the same lap, and the wheels one size, with both the boilers of equal pressure, is it possible to make one of the two engines more powerful, and to run at a greater speed, and the consumption of fuel less than the other? And, as the question has not yet been answered, I should like to hear the opinion of the querist on the subject.

I am,
Yours truly,
T. B.

Sir,—In reference to the Ambulance Queries in October Journal, I should say that fractured ribs would be detected by the jerky, difficult breathing of the injured man; he would also experience great pain, by reason of the ribs rising and falling at each inspiration and expiration, and allowing the broken ends to grate against each other. The grating noise would be more marked if the man coughed. My treatment would be to place the ribs at rest by applying a flag tightly round the chest to stop the movement of the ribs, or by tightly securing his waistcoat or coat round the chest. Of course, a roller bandage would be the best, but that might not be forthcoming.

For the detection of a broken leg, the injured man would be unable to use the limb, it would also be shorter than the sound limb if both bones in the leg were broken. It would be unusually movable at the seat of fracture; it would be altered in shape, the crepitus would be heard on placing one hand on the broken part and moving the limb with the other, and the inequality would be felt by passing the fingers along the surface of the injured bone or bones. My treatment would be to pull the injured limb level with the other, apply splints of wood, rolled newspapers, or get a coat and put it under the injured limb, and draw it up the sides of the leg and fasten it with bandages, handkerchiefs, spun yarn, or anything you may have handy, above and below the seat of the fracture, and tie both legs together above and below the knees and at the ankles, and if a flat piece of board could be obtained, it would be well to put it underneath the legs and fasten it, and if a proper stretcher was not at hand you might make one with two overcoats and two shunting poles, or other long pieces of wood, the sleeves of the coat being turned inside out and the poles put through them, and the coats buttoned up, but in all cases obtain medical assistance as early as possible.

Yours, T. B.

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QUERIES.

No. 1.—Sir,—Will any of your readers kindly state the real action of Joy's Valve Gearing, chiefly in regard to its giving the valve lead, to admit steam into the cylinder, to form a cushion for the piston when at the end of its stroke?

No. 2.—Also, do the eccentrics and links allow the valve to form the same amount of lead when the engine is notched up as when the lever is in full gear?

Answers will oblige,
Yours truly,
ECCENTRIC.

No. 3.—If when turning the engine on a turn table at some out station, the handle should slip round and fracture the fireman's arm above the elbow, how could the same be detected, and what would be the best treatment?

No. 4.—A driver in examining his engine on the pit, put his right hand on the metals, and whilst in that position another engine gave the one he was examinining a slight bump, but the brake not being properly applied his engine was moved forward and his hand taken off. Should a similar accident occur what would be the best treatment? Answers will oblige.

ENQUIRER.

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Society News.

BRADFORD BRANCH.

November, 1888.

Sir,—Since sending you an account of our special meeting, at which we made six new members, I am pleased to say that six more have been enrolled, thus giving us an increase of twelve members in less than a month. We shall shortly have another special meeting for the purpose of deciding upon a Christmas treat.

I am, yours truly,
T. Allatt.

OPENING OF A NEW BRANCH AT NORMANTON.

A general meeting of enginemen and firemen was held under the auspices of the A.S.L.E. & F., at the White Swan Inn, Normanton, Yorkshire, on Sunday, Oct. 14th, 1888, for the purpose of opening a Branch of the Society at Normanton. After the opening remarks of the chairman, an L. & Y. driver, Messrs. Sunter and Ball delivered stirring addresses on the objects and benefits of the Society, which were apparently listened to with interest throughout, and at the close of which the following resolutions were unanimously carried :

1. That this meeting, having heard the objects and benefits of the Associated Society of Locomotive Engineers and Firemen, are of opinion that it is advisable that a branch should be established at Normanton. And the branch was then formally opened.

2. That a special meeting be called on Sunday, Oct. 21st, for the purpose of electing officers and the further enrollment of new members.

3. That the branch meetings be held every alternate Monday, at 10-30 a.m.

I have now the satisfaction of informing you that at our special meeting we had a very fair muster, which would have been larger but for the fact that a number who had promised to attend had to be on duty owing to the foggy weather that had prevailed during the week, and, although the names of nineteen enginemen and firemen is but a small number for a place like Normanton to record, I feel convinced that we shall make headway now that the branch is established, for I have been told on many occasions by enginemen and firemen at this Station that they would join when once the branch was opened.

Trusting that I may soon be enabled to send you some good reports,

I remain,
Yours fraternally,
G. H. Hirst,
Branch Sec.

THE ORGANISING SECRETARY AT CARMARTHEN,—OPENING OF A NEW BRANCH.

A general meeting of locomotive enginemen and firemen was held at the Assembly Rooms, Carmarthen, on Sunday, Oct. 28th, under the auspices of A.S.L.E. and F., the meeting commencing at 2 p.m., and although the wind blew and the rain poured down in torrents, it did not damp the ardour of our men, for when the meeting commenced there were 63 enginemen and firemen present, including friends from Landore and Llanelly. Our Milford friends were prevented from attending the meeting through no fault of their own. Twenty sent their names to become members of the branch.

Engineman Mr. A. Buckland was voted to the chair, and proved himself to be the right man in the right place ; for in a very pithy and forcible manner he succeeded in giving the key-note to the meeting. He pressed home the beauty there was in enginemen and firemen becoming united in bonds of brotherhood, and said he felt proud to be a member of such a Society, after which he called upon Mr. Ball, the Organising Secretary, to address the meeting, and on his rising we gave him a hearty Welshman's reception, after which he delivered a most explicit and stirring address upon the objects and benefits of the Society, the needs of such an organisation, its use and progress, and prospects for the future. Mr. Ball had very little difficulty in satisfactorily explaining to us the part our Society played in regard to the securing the acquittal of Taylor and Davies. Right well did he hold the meeting spell-bound when he clearly demonstrated how enginemen and firemen could be successful in becoming a thoroughly organised body of men if they enlisted under the A.S.L.E.&F.

Mr. Ball having completed an address of fifty minutes duration, the chairman said the meeting was open for any person to speak, and I was pleased to see many avail themselves of the opportunity to speak a cheering word in the interests of our Society.

The chairman then made an earnest appeal to non-members to consider well the offers held out to them, and in hearty response thereto it was grand to see them come up to the table to give in their names, and our expectations were more than realised, for before the meeting closed we had successfully opened a branch of the Society with 40 members, including several transfers from other branches.—Well done, Carmarthen.

I am, yours fraternally,
T. T. MILLMAN.

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OPENING OF A NEW BRANCH AT WIGAN.

On Sunday, November 4th, 1888, Mr. T. Ball, Organising Secretary, opened a branch of 19 enginemen and firemen, working on the L. & Y. and L. & N. W. Railways. During his remarks in declaring the branch opened, he informed us that Wigan branch made the eleventh that had been opened this year, three of them within a month, and he hoped we should not be behind our Salford and Blackburn brethren, who had in a very short space of time worked up splendid branches, and from what I know of some of the men who have joined us we shall soon be enabled to achieve a similar result, for they are men who have always been in the front rank in endeavouring to do all that lay in their power to better the condition of those with whom they work.

We are also indebted to the proprietor of the Rock Hotel for his kindness in granting us the free use of his splendid club room in connection with the opening of our branch, and it was decided to held our future meetings at his house, the first of which will take place on Sunday night, November 18th, when we hope to have a good ingathering of new members. I well remember the time when the Society was comparatively unknown, but I am pleased to say that the same cannot be said of it now. On the contrary, its necessity and usefulness is now being recognised and felt by enginemen and firemen working on every railway in England and Wales; and I am of opinion that a brilliant future awaits it, and that ere many years have elapsed, it will have become a gigantic institution.

I am, yours truly,
J. GOUGH, Branch Sec.

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SPECIAL MEETING AT BRADFORD.

An open meeting of enginemen and firemen was held at the Granby Hotel, Bradford, on Sunday, October 7th, under auspices of the A.S.L.E. and F., the room being well filled. Mr. D. Coulton occupying the chair, and Mr. W. Stephens the vice-chair. The chairman, who at one time had been an engineman, and who had grown grey in the service, made some happy allusions to the Society and the benefits that it had conferred on the members of the Bradford branch. Mr. Sunter, general secretary, and Mr. T. Ball afterwards addressed the meeting at considerable length upon the objects and benefits and progress of the Society, and of the necessity of enginemen and firemen belonging a Society of their own class. Both addresses were well received, at the close of which six enginemen and firemen were proposed for membership. The vice-chairman then spoke of the utility of the Society in a most creditable manner. Votes of thanks to the visitors and chairmen then brought the meeting to a close.

I remain, yours fraternally,
T. ALLATT, *Branch Sec.*

SPECIAL MEETING AT LLANELLY.

An open meeting of the enginemen and firemen was held at the Neptune Inn, New Dock, Llanelly, on Sunday, October 28th, 1888, under the auspices of the A.S.L.E. and F. The chair was taken at 6.30 by the branch chairman. Stirring addresses were given by Mr. T. Ball, organizing secretary, and several brother members from Landore and Carmarthen, at the conclusion of which we succeeded in making seven new members, and three others promised to join next lodge night. Votes of thanks to the chairman and visitors brought to a close one of the most enthusiastic meetings we have had in Llanelly, which was attended by every officer and and private member connected with the branch. I remain, yours fraternally,

F. G. R.

SHEFFIELD BRANCH,

Sir, *Oct. 3rd*, 1888.

Our quarterly meeting was held on Sept. 30th, with a very large number of members present, fully 130 members paying up on that occasion. One remarkable pleasing feature of the meeting was the liberal response by both M. S. and L. and M.R. members to an appeal on behalf of an unfortunate member present, and it is by such acts of kindness that our Society is rapidly finding favour with enginemen and firemen, as they are becoming more and more convinced of the truth of our grand motto, "Brothers in unity for mutual help." We also enrolled one promising young fellow as a member.

I remain, yours fraternally,

T. BRIERLEY, *Branch Sec.*

LEEDS BRANCH, *Oct. 3rd*, 1888.

Sir,

I have pleasure in reporting that our last meeting, on September 30th, was fairly attended, and two new members admitted, and I hope to be enabled to report an increase after our next meeting. It was also decided that our branch meetings be held the last Sunday in each month at 6.30 p.m., instead of Mondays.

Yours truly, J. C., *Branch Sec.*

PETERBOROUGH BRANCH,

Oct. 4th, 1888.

Sir,

I am glad to inform you that we made one new member at last meeting. Our progress may appear somewhat slow to some of the branches, but it is none the less sure.

I am, yours fraternally,

J. F.

KING'S CROSS,

October, 1888.

Sir,

Last Sunday, October 7th, being our Quarter Night Meeting I am pleased to inform you that we had a splendid meeting. All members off duty being in attendance, and contributions well paid up. Before the close of the meeting six new members joined, including an honorary member, E. Gobert, Esq., Civil Engineer, of London, who afterwards addressed the meeting, and has promised to attend our next meeting on Sunday, November 4th, and read a paper on "Automatic Brakes;" discussion will be invited, and it is intended to have the meeting an open one to enginemen and firemen. Yours fraternally,

F. GREEN, *Sec.*

WOLVERHAMPTON BRANCH,

Oct. 6th, 1888.

Dear Sir,

Just a few lines to say that we are continuing to make progress, and I shall be glad if you will insert in the next issue of our *Journal* that we have added three new members to our list since last writing you, one of them being an honorary member, and the proprietor of the Gladstone Inn, where we hold our meetings.

I am, yours truly,

Branch Sec.

SWANSEA BRANCH,

Oct. 30th, 1888.

Sir,

I am sure you will be glad to hear that our last quarterly meeting was a good one, in fact, one of the best I have yet attended in connection with our branch. Contributions were well paid up, and we enrolled two new members and transferred one protection member to full benefits, and I take this opportunity of informing our brother members at a distance that since the commencement of the present year we have increased our membership from 38 to 58, but I can assure them it has not been accomplished without a large amount of labour on the part of a number of our most earnest workers, who do not intend to yield the palm to anyone in their endeavours to obtain recruits, and who, I am sure, will leave no stone unturned that will assist them in legitimately winning to our ranks the few remaining non-members at this station, and even when that is accomplished they do not intend to rest upon their oars, but wil continue their efforts so long as any fresh faces are to be seen in this district. My object in writing in this strain is to try to impress upon all members the necessity of individual effort, and that a member's obligation does not end with the payment of his contributions, but that each one should feel that the success of our cause depends in a great measure upon the interest he takes in propagating our doctrine amongst the non-members with whom he may come in contact.

I was recently engaged in conversation with an engineman concerning our Society, and, to my great suprise, I was informed by his fireman that he knew nothing of the Association or its usefulness. I of course took him in hand, with the result that he is now a member.

I am aware there are men who will tell you they have never heard of the Society when you attempt to approach them on the subject, who are, in reality, as well acquainted with its objects and benefits as yourself, but there are others who are completely ignorant of them, because they are too indifferent to make enquiries, and their mates do not mention it to them, but if every member would make it his duty to explain the nature of our Society to them, they would succeed in making numerous converts, and although they may at times meet with rebuffs, they must keep on persevering, well knowing they are working in a good cause, and that they will one day reap the fruits of their labours.

I remain, yours fraternally,
J. JAMES, *Branch Sec.*

The following branches have also enrolled new members :—
Liverpool, Bow, Paddington, Openshaw, Birkenhead, Sandhills, Pontypool, Neath, Oxford, Mexborough, Stratford.

BRANCH MEETING HOUSES.

SHEFFIELD.
Albion Inn, Johnson Street, Wicker. Alternate Sundays.

PONTYPOOL.
Hanbury Hotel, Griffiths Town, Newport, Mon.

NEATH.
Three Cranes Inn, Wind Street, Neath. Alternate Sundays, at 7.30 p.m.

LEEDS.
Prince of Wales Hotel, Mill Hill. Last Sunday in the month, 6.30 p.m.

LIVERPOOL.
American Tavern, Byrles Street, Toxteth Park. Held fortnightly.

BRADFORD.
Granby Hotel, Union Street, Bradford. First Sunday in month.

LLANELLY.
Neptune Hotel, New Dock, Llanelly.

SANDHILLS.
Brown Cow, Walton-on-the-Hill. Alternate Sundays.

SWANSEA.
Monthly—Landore Coffee Tavern. Saturday, at 8.30 p.m.
Quarterly—Oram's Coffee Tavern, Wind Street, Swansea.

NOTTINGHAM.
Mission Room, Queen's Walk, Nottingham. Every Monday at 8 p.m.

BRISTOL.
Phœnix Hotel, Totterdown. Every fourth Sunday at 7 p.m.

PLYMOUTH.
At Mr. Sleeman's, 31, Harwell Street. Last Sunday in Quarter at 6.30 p.m.

YORK.
Adelphi Hotel, Railway Street, York. Alternate Sundays at 8 p.m.

PADDINGTON.
Builders' Arms, Westbourne Park, London. Every third Sunday.

NEWPORT.
New Bridge Inn, Bridge Street. Alternate Sundays, from May 6th.

BOW.
City Arms, Devons Road, Bromley. Fortnightly, on Fridays.

OPENSHAW.
Drovers' Arms, Ashton Road, Openshaw. Alternate Sundays at 7.30 p.m.

MEXBOROUGH.
South Yorkshire Hotel, Mexborough. Last Sunday in the month at 7.0 p.m.

STOCKPORT.
Nicholson's Arms, Lancashire Hill. Last Sunday in the month at 6.30 p.m.

BIRMINGHAM.
Small Heath Hotel, Coventry Road. Alternate Sundays.

BATTERSEA.
The Two Brothers, New Road, Battersea, London.

RETFORD.
Oddfellows' Arms, London Road, South Retford. Monthly at 8 p.m.

LINCOLN.
Arcade Coffee Tavern, Lincoln. Last Sunday in the month.

STRATFORD.
Railway Inn, Angel Place, Stratford, London.

WOLVERHAMPTON.
Gladstone Inn, North Road, Wolverhampton. Meetings held monthly.

GRIMSBY.
Friendly Society Hall, Lower Spring Street. Alternate Sundays at 10 a.m.

BIRKENHEAD.
Borough Hotel, Birkenhead. Meetings alternate Sundays.

READING.
Blagrave Arms, Blagrave Road, Reading. Meetings Monthly, at 8 p.m.

BLACKBURN.
Dolphin Hotel, Blackburn.

PETERBOROUGH.
Pavilion Hotel, Park Road.

STOURBRIDGE.
At Mr. Barnetts, The Mitre Hotel, Stourbridge. Monthly, Sundays.

MANCHESTER.
Tower Hotel, Cathedral Yard. Every alternate Sunday at 7.0 p.m.

TONDU.
Llynvi Arms, Tondu, South Wales.

KING'S CROSS.
The City of London Hotel, York Road Cattle Market, London. Meeting nights for year—Dec. 2nd, Dec. 16th.

CARDIFF.
Great Western Coffee Tavern. Last Sunday in the month, at 3.0 p.m.

CHESTER.
Mrs. E. Cooper's Ermine Hotel. Every alternate Sunday after September 9th, at 7.30 p.m.

EXETER.
New Market Inn, Goldsmith Street, Exeter.

WORCESTER.
The Black Horse, Lowesmoor, Worcester. Every third Sunday from Oct. 28th.

WIGAN.
The Rock Hotel, Warrington Road Ince. Next Meeting, Nov. 18th.

Branch Secretaries will oblige by sending us the time and place of their Meeting Houses.

LIST OF BRANCHES.

We have now branches at the following places:—

Sheffield
Neath
Plymouth
Exeter
Oxford
Toton
Lincoln
Liverpool
Retford
Gloucester
Llanelly
Mexborough
Nottingham
Newport
Pontypool
Cardiff
Swansea
Skipton
Grimsby
York
Peterboro'
Bradford
Openshaw
Stockport
Leeds
Sandhills
Wolverh'ton
Bristol
Carnforth
Birmingham

LONDON BRANCHES.

Paddington
Kentish Town
Bow
Battersea
King's Cross
Stratford

* * *

BRANCHES OPENED THIS YEAR.

Reading
Manchester
Tondu
Carmarthen
Birkenhead
Blackburn
Chester
Wigan
Stourbridge
Worcester
Normanton

Obituary.

It is with sincere regret that we have to record the death of Gerald Blackwell, a late member of the Nottingham Branch, who was killed in South America on August 6th last. He was formerly a fireman on the Midland Railway, and one of a number of Nottingham men who emigrated to Chili in consequence of losing their situations through the Midland dispute. The deceased was thirty years of age, and single; he was of great promise, and his kindly disposition had endeared him to all with whom he had come in contact in his new home, as will be seen by the account of his death which appears in our Correspondence column, and which has been forwarded us from Chili by Mr. J. Harper, an old mate who went out with him to South America, and his graphic account of the disaster cannot fail to impress our readers of the suddenness with which the poor young fellow was launched out of time into eternity.

LOCOMOTIVE ENGINEERS AND FIREMEN'S

Monthly Journal.

"This that they call Organization of Labour is the universal vital problem of the world. It is the problem of the whole future for all who will in future pretend to govern men."—THOMAS CARLYLE.

"I know no better definition of the rights of man:—Thou shalt not steal; Thou shalt not be stolen from; what a society were that—PLATO'S REPUBLIC, MORE'S UTOPIA, *mere emblems of it! Give every man what is his—the accurate price of what he has done and been—no more shall any complain, neither shall the earth suffer any more."*—THOMAS CARLYLE.

VOL. 1. DECEMBER, 1888. No. 11.

A TERRIBLE RIDE.

"Is my special engine ready ?"

"In a moment, sir ; the engineman will be here directly."

"I shall ride upon the engine !"

"You will hardly have eyes left in your head if you do, sir ; but 'tis your train, and of course you may do as you please."

I stood upon the platform of a railway station in a northern town. My interlocutor was the resident superintendent. I was the bearer of important despatches for a London morning newspaper, and somewhat more than three hours was the utmost space of time I could afford to shoot over the 200 miles which separated me from the Strand. I was growing fidgety and impatient.

"What can be the matter with Westhorpe?" exclaimed the superintendent.

"I have sent after him," said the foreman. "He reported himself fit for duty this morning. He's ne'er the same man, sir, since Mary Slane died so suddenly."

"But why don't you let me have another man if this one is not fit for work ?" I asked.

"Sir, the fact is that our men have been over-worked lately, and as Westhorpe sent word that he was ready, we arranged accordingly."

"Seven o'clock past," I replied. "If you do not start me in five minutes I countermand the engine and will have my own remedy by law."

But before the five minutes elapsed the tardy driver made his appearance, muffled up in a shaggy pea-jacket, and with his cap pulled down over his forehead. But I could observe the bright hollow glare of his eyes, the clammy palor of his cheeks, and the restless, nervous state in which he appeared to be, as his hand trembled, and he glanced quickly round from face to face.

These appearances might have alarmed me at another time, but I was too eager for the start to attend to them.

"Westhorpe," exclaimed the superintendent, "if this is the way you treat your employers, I can tell you that you shan't long be one of their employed, my fine fellow."

The driver muttered something, and mechanically got upon the engine.

"You shunt the three o'clock train at Bramsby, and the one o'clock goods at Thornley. Mind you keep a sharp look-out, don't spare the whistle, and go sharp through the stations."

"I'll look after that," I exclaimed. "Good night ! we shan't let the grass grow under our wheels ! Come, Mr. Westhorpe, let's have a taste of the quality of the 'Engine.'"

The engineman touched his cap and soon we were fairly on our way in the open country.

"On, Mr Westhorpe! crack on! A good supper and a better bottle of wine for you when we get to town."

"Thank ye, sir," said the man, but without looking into my face; and then turning away, he began to grope for something in the matting on which he stood, muttering all the while to himself. There was something indescribable in the man's manner, and I observed that the stoker looked at him with evident uneasiness, and addressed him not a word. The speed of the engine was rapidly increasing; the hedgerows flew by us in a long dusky line; the swaying motion of the engine grew to be a quick, swinging jolt. On we flew along high embankments, and down with a sweep between deep cuttings. The steam monster seemed instinct with life and bounded like a mad thing on the rails. Yet, though not a breath of wind was stirring, a hurricane, cold and piercing, appeared to be tearing by us back into the lonesome night. So far all was well. I knew the line was clear, and the night was quite bright enough for us to perceive any signal half-a-mile off.

Meanwhile Westhorpe stood fidgeting away with the engine, never still for a moment, and he kept stamping and shuffling with his feet. The stoker leaned against the railings, clutching them in an alarmed and anxious manner. On we went mile after mile, station after station; we might be already from twenty-five to thirty miles on our journey. "She goes bravely," said I, shouting the words into Westhorpe's ear.

The stoker came up close to us, and listened for the reply, The engine-driver looked quickly from one to the other, his eyes glared like a wild beast's, and he suddenly exclaimed to his fellow labourer, "Coal Jeffries, coal; more steam. The gentleman must have more steam. Never mind life! steam! steam!"

I was startled by this burst; so was Jeffries. He hesitated. "Coal!" shouted Westhorpe. "By the heaven above us, do your duty, or over you go on to the rails;" and, as he kicked open the furnace door, I heard the roar of the fierce fire above the howl of the tornado we appeared to be stemming. "I think we are getting over the ground very well," I faltered "You don't want to go quicker?" said Westhorpe, speaking low and very fiercely. I shook my head. "Well, I do," roared the excited man. "Coal, Jeffries, coal!" and he struck the stoker with his clenched fist. For a moment I stood stupefied, and would have given all the world to be left safe and sound on the dreary common we were passing. Jeffries, without a word, took up the shovel and threw the black masses into the fire, which crackled and roared again. By its glare, as he stopped, I saw that under its mask of smut his face was deadly pale.

The engine appeared to fly, and the sway was terrific. "Music," shouted Westhorpe; "we'll have music! Here's my boiling water organ!" and he set on the steam-whistle; it's scream went through my brain. The stoker looked at me. I saw he was trying to catch my eye; the expression of his face was one of consternation and horror. All at once the horrible whistle ceased. "It might give warning," Westhorpe muttered; "and besides it's wasting the steam."

I shuddered. Suddenly the driver turned from the engine, and stepping to the tender, gazed long and anxiously back. Jeffries took advantage of the motion and clutched me by the arm.

"Hush!" he said breathlessly.

"What is the matter with the man?" I said.

"Hush! He is mad! I've thought so these two days."

Mad! I felt the cold sweat break out at every pore. A mile a minute with a mad driver! My flesh crept, and I felt sick and faint.

"We must master him between us," gasped Jeffries.

"We can," I said. "It is our only chance. Come on."

The words were hardly uttered when Westhorpe sprang round. "I heard you," he shouted. "Treachery, treachery! Two to one, but come! come! come!"

There was a pause. No one stirred. Then I saw Jeffries' hand gliding towards a heavy hammer which lay close to him. The maniac glared from one to the other of us; I could not fix his eye, but I felt that he watched my every movement. Jeffries' hand was close to the hammer, when, with a yell, Westhorpe flung himself upon the stoker. "You would, would you?" the madman growled out. "Then take it!" He flung his arms around the wretched man, who clutched convulsively at any object within his grasp. "Save me!' he screamed; "Save me!"

But I was paralysed. With one superhuman effort Westhorpe tore the wretch from his crouching position, and, with limbs which appeared to swell with iron muscles, tossed the strong man like a child in his arms, and yelled a maniac laugh.

"Help! help!" screamed Jeffries. "My wife at home!"

"Then go home to her!" shrieked Westhorpe, as he heaved the struggling victim high in the air; and I heard the dull, dead, plashing dint with which he was dashed to pieces on the stony ground.

Westhorpe turned suddenly round. "Mad!" he shouted; "I believe you—I am mad!" He clenched my collar and drew me to him; I was a mere child in his arms. "Mad! Yes; I tried long to keep it down. Oh! how I fought with it, wrestled with it, and said to myself, 'No, I am not mad,' when I knew that I was. Mad! I believe you. I feel it now. I now the pleasure of it. Who would be sane—ha! ha! ha!—if he knew what a life a madman's is?"

He unloosed his grasp, and I sank into a corner, almost unable to articulate. His paroxysm appeared to pass away for the moment, and he stood muttering. Then catching up the shovel, he set himself to trim the fires anew. A thrill of horror again passed through me; we were going at a pace to which all others I had ever travelled were child's play. I tried to compose myself to my fate. If the engine did not leap off the rails, sooner or later we must arrive at the obstruction which would, with one mighty blow, smite us into dust for ever.

Again he turned and looked into my face. The madman had the mastery—oh! that lustrous, blood-shot eye—that ghastly, working, twisting visage!—at length he spoke, slowly, nay, calmly.

"We are now going faster than ever mortal man travelled since the world was a world! Now tell me, do you think spirits can fly as fast?"

Never shall I forget the sepulchral tone in which this question was put. He paused, but without, however, appearing to wait for an answer. I imagined that in his present mood I could soothe him down, and regain that moral mastery over him which the sane, by coolness and self-possession, so frequently acquire over the victims of mental disease. Cheered by this hope, I looked him steadily in the face, and began to speak in mild, coaxing accents.

"Do you think we need trouble ourselves to keep the engine at such a speed?"

"I fear we must," he said, sadly; "there would be danger in a mile an hour less." I paused, completely puzzled. What were the train of ideas passing in the madman's brain?

"You have been ill!" I continued, in the same coaxing tone.

"No! Yes! yes! oh yes, very, very ill!" Westhorpe spoke with apparent languor and difficulty.

"Particularly within the last three days!" I resumed.

He started back, and exclaimed fiercely, "Ill! No, not ill, Drunk!"

"Drunk!" I echoed mechanically; a flash of light crossed me--the man was suffering under *delirium tremens*.

"Yes, drunk!" he shouted, with all his former wildness, "I've been drunk since her death; I shall be till my own! Drunk or mad, there's little difference! I tell you I must drink—it lays here—it keeps her off from me! She haunts me, she persecutes me, and I must drink!—drink!" then suddenly producing a small empty phial, he turned away his head, and in a half smothered voice said, "Read the label!"

I did—"*Prussic Acid— Poison.*"

"I didn't give it her," he cried. "I didn't—she took it of her own accord! Before God she did!—but she took it because I said she should never be my wife—I am her murderer, though I didn't give her the poison! I murdered the only woman I ever loved—God help me! oh, Mary Slane—but you are revenged! You have never left me since! You hung over my bed at night—you walked at my side in God's sunlight in the streets—you looked in my face over the glass as I drank burning spirits—you rode with me on the engine! I have seen you everywhere, everywhere! Ah, ah! I see you now! you are following us, following us through the night! But you shan't catch us! you shan't! you shan't!"

And the maniac, starting up with a howl like a wild beast, urged on the levers, and, actually screaming with terror, tugged and strained at any portion of the rattling machinery he could reach, as though to increase its speed. The paroxysm then appeared to pass away for the moment, and he again turned to me.

"You saw her face, eh? Was'nt it ghastly? It was just as she looked out of her coffin—just!"

"I'll show her something," he muttered, after a pause. "I think she'll like to see it." Another pause. "Open this," he said, at length, and I received a carefully tied parcel from his hand. "Untie it," he said, as he turned away, unable to watch the opening. The first envelope was one of brown paper; under it was one of somewhat more delicate texture. Then followed wrapper after wrapper, until I thought the whole would prove a mere bundle of waste paper. I was deceived, however. I came at last to a carefully folded envelope of silk paper. I tore it open, sheltering it from the rush of air, and to my utter amazement found its contents to be half-a-dozen withered blades of grass. An involuntary exclamation escaped me.

"Have you done it?" muttered Westhorpe, gnashing the very words between his teeth.

"Grass!" I exclaimed. "Here's nothing but grass."

He bounded round, clutched the withered herbage, and, holding it aloft, shouted, "See, Mary Slane, see! grass from your grave, Mary! grass pulled by your murderer, Mary! Night after night have I passed upon the sod that covered you, and, whenever I left it, I carried the grass against my heart. Oh Mary, mercy! pity! I loved you, indeed I did. I would have been a good husband, Mary, but it was not to be, my lost, lost Mary." He paused. The moon, at that moment bursting forth, shone down upon the distorted face and foaming lips of the engine-driver. As he paused, he appeared to listen. I watched him narrowly. The expression of his face changed, he raised and clasped his hands whilst his countenance, harrowed and convulsed by mad terror, gradually relaxed, a smile stole round his mouth, and every feature became instinct and dilated with a yearning, grateful joy.

"I forgive you! Oh! Oh! Mary, Mary, say those words again! God bless you, Mary—your face is like an angel's now!"

He listened, and, Heaven help me, I listened too, for the spirit voice. I heard but the roaring of our iron race. Not so Westhorpe; his face gleamed, and his eyes again sparkled.

"God's thanks, Mary! I am pardoned!" and then, covering his face with his hands, he fell into a loud fit of weeping.

Now was my time; now or never. I looked forth; ahead of us sparkled the lights of D——. They were miles away, but minutes at our present pace would shoot us in splinters through the walls of the station. I knew the process of shutting off the steam, and, grasping the lever, I turned the fierce tide of vapour from the mechanism, when Westhorpe, as if by instinct, sprang up, and, with a roar of hoarse fury, dragged me from the machinery. One of his huge hands was clutched round my throat—I writhed under the workings of his great iron muscles—whilst with the other he wrenched the lever, and I *felt* the steam set on again. I groaned faintly. He grasped me by both shoulders, and drew me to him. I made one effort—one struggle. Twisting my legs round his, by a sudden wrench I succeeded in flinging him backwards with a heavy crash. The advantage was, however, but for a moment. I felt his strength rising beneath my weight like a Titan's. With one bound he was on his feet, grasping me in his arms.

"There! Go after Jeffries!" he roared. My muscles involuntarily contracted. I seemed to shrink into a ball as I felt, by the winding-up, as it were, of the muscular power of his arms, that he was almost in the act of flinging me down the high embankment we were then shooting across. All at once he screamed out:

"There's the lights of D—— ! the red signal to stop; we'll go through it—through walls, houses, streets! Stop! Ha! ha! ha!"

I held my breath; my head spun round and round; blue and yellow flashes appeared almost to illumine my brain; the sway of the engine increased—it rocked, and bounded, and roared down the incline. I heard the exulting scream of the maniac, mingled with shouts, and whistles, and ringing of bells, which seemed to rise on every side. I saw pillars, lamps, engines, all one confused, gleaming, shooting mass. Then, with a yell which seemed to transform all nature into one wild, ghastly death-shriek, we dashed on—on nothing!

* * *

"Now, then, tickets please, gentlemen. Get your tickets ready." I started up with a stammering cry.

"Halloa! halloa! What's the matter with you? You've been groaning and moaning in your sleep for the last half-hour."

"Westhorpe! Westhorpe!" I gasped.

"The man's asleep now. What the deuce do you mean by Westhorpe? Rouse up, man, and let's have some stout and sandwiches." I sank back.

"It was a dream, then!" I muttered.

"Aye, a railway nightmare, my boy. Didn't I warn you of that beefsteak pie at Leeds? But what was it all about. You were thinking of some express work, were you not?"

"I was. Thank God, it was but a dream: as you say—a railway nightmare."

Scientific.

SOURCES OF POWER.

In the older treatises on mechanics we find the sources of power classified under the heads "wind, water, steam, animals"; and, broadly speaking, these are still the only sources of power we possess. But when we deal more in detail with the subject, we find that wind, in all probability, owes its capacity for performing work to the sun, while water is absolutely inert save as actuated by gravity, and steam is, of course, merely an agent by which heat is converted into work. Concerning the methods by which animals perform work we are entirely ignorant, no physiologist having as yet succeeded in tracing the sequence of processes by which food is converted into mechanical energy. Enough is known, however, to shew that the process has nothing in common with that by which work is performed by heat engines; so that the analogy sometimes drawn between a man and a machine must be rejected as far-fetched, permissible to the poet, indeed, but not to the philosopher. Furthermore, it is known that the work got out of food by men and animals is much greater, on the whole, than can be obtained from fuel consumed in the best steam engines. That is to say, a man or a horse may be more economical sources of energy in one sense than any machine. Be this as it may, it is sufficiently evident that we depend for the performance of any work done in the world on two sources of power—heat and vital energy. The action of gravity, it is true, causes the falling of water, and so gives out power; but the water has to be raised before it can fall, and this raising is effected by the heat of the sun, which evaporates moisture. and so indirectly gives us clouds and rain.

It appears to be not unreasonable that men should ask themselves now and then if there are no other sources from which power may be derived—is there no other force of nature that can be made the servant of man? The question has been put in hundreds of ways and remains unanswered.

In dealing with this question of sources of energy it seems to be not impossible that a misapprehension of the nature and bearing of the laws of the conservation of energy may do a great deal of harm. It may be said, for example, that it is quite useless to search for a source of energy which can be better and more economical than we have now, and much more to the same effect. But let us ask ourselves what is this law of the conservation of energy, on what is it based, and what would be the consequence to the universe if it did not exist? Such questions are very seldom asked, because the number of men who take the pains to think for themselves is small. But when they are asked, the answer is remarkable. There is really no reason at all why energy should be conserved, and so far as our senses supply evidence, far from being conserved, it is being wasted every day. Of course, if we go a little behind the evidence of our senses, we find that the waste is only apparent, not real. It is much easier, however, to form an idea of a universe in which the law of the conservation of energy has no existence than it is to realize a fourth dimension in space, or even the life of the inhabitants of Flatland. As a help to the realization of such a universe, we may point to the fact that the sun has been giving out energy for millions of years, and that there is no reason whatever to think that he has lost any portion of his original heat. In other words, it is simply impossible to prove that what we call energy is not created in the sun.

Again, let us take gravity. We have here the most stupendous force in nature. There is no reason to imagine that it is capable of degradation. If all the planets fell into the sun, gravity would of necessity have to perform an enormous amount of work; but no one can say that after it was done gravity would be any weaker. It may, indeed, be said that the law of the conservation of energy has only escaped being disproved, if the words "conservation of energy" be used in one sense. So far as can be seen, there is no reason why the line of magnetic force should not behave like lines of electric force or heat force, and admit of being intercepted or stopped. It would then suffice to put a permanent magnet under the end of a beam the other end of which should be connected in the usual way with a crank and fly-wheel. Then by interposing and withdrawing a thin intercepting plate at the proper intervals we should have a machine which would work steadily until it was worn out, without the expenditure of one farthing for fuel. In the popular sense of the word we should create power, and the perpetual motion men would spend their lives in patenting details, while the principle would be public property. Has any one the least idea why magnetic force lines should traverse every known material? Can any one assert that if this was not the case the existence of the universe would be impossible or even difficult? Can any one assert with certainty that no means will ever be found for intercepting or dissipating magnetic rays, without expending energy in doing so? Finally, is it not possible to obtain some idea of the cause of magnetic force from this very peculiarity of its behaviour? To put an extreme case, it may be urged that the law of the conservation of energy being true, it is impossible to intercept a magnetic force line. What, then, is the nature of the force that will comply with this condition? On the other hand, it is possible to intercept a heat, light, or electrical line, and yet the law of conservation of energy is not interfered with—*ergo*, magnetic force must possess features that distinguish it from the other forces we have named; from all other forces, indeed, save gravity. One deduction seems to be consistent with facts, namely, that magnetism and gravity are original or primal forces, and that the remaining forces, such as light, heat, and electricity, are derived, built-up, or composite forces. That, in a word, gravity and magnetism are elements, while light, heat, and electricity are compounds. We speak of light, heat, and electricity as "forces"; perhaps it would be more strictly correct to style them manifestations of force. But what we have written will convey our meaning.

The sum of what we desire to convey is that there is nothing known which renders it absolutely certain that mankind may not yet find new sources of energy in nature. No one can assert positively that it must always be impossible to make electricity work for us. If a man had shewn Socrates a lump of coal and told him it could be converted into work, he would have laughed at him. Our purpose in writing this article will be served if we make our readers understand that there is, as yet, at least, no finality in science. There is no reason, for example, to conclude that it is absolutely and physically impossible that new sources of power may yet be discovered which are not now dreamed of. The electricity which now rends the forest oak, or brings down the lofty edifice in a hideous ruin, may yet be taught to light our towns. Chemical science may give us new reactions which will supply large sources of power. The world does not yet know everything; and he who knows most is least likely to assert dogmatically that things which do not exist now can not exist in time to come.

* * *

HOW TO LIVE LONG.

The desire for a long life seems to be a part of the instinct of humanity. Sometimes it does not seem to be at all modified by the prospect of continuous and severe suffering. But in the desire for a long life, we surely should include the desire for a healthy life.

The great inclination of youth is to exercise. The free use of the body up to the extent of its powers is not only the means of acquiring more power, but to retain what we have. So we are to insist upon it that all through the growing period of life the law of activity prevails. There is no substitute for it. This tends to prolong the period of growth. Some have contended that the longer this period can be made the more likely is long life to be secured. Animals that live long are generally slowest in reaching their fullest perfection. Food at the early periods needs to have special reference to construction. Hence it is that milk and eggs and all the various foods are relished in quantities. In childhood the healthy appetite accepts all of the various forms of food. There is growth, energy, and much constructive force, and so all of the food elements are needed. Later on, the person, if wise, comes to study food and exercise with reference to the kind of exertion that is to be put forth.

The in-door life, even if it be one of toil, must not be dealt with as is the out-door life. Sedentary callings must have some relief by exercise in the open-air if the same food supply is used. Now is the time, too, to study the tendency of the system. If it is to be leanness on the one hand, or plethora on the other, the fact should govern the diet.

Most of those who die between 25 and 60, unless they die by accident, die by some indiscretion. It is the over-indulgence of appetite, or the neglect of food when needed, or the overstrain of business, or exposure to changes of temperature without corresponding changes of clothing. It is intelligent caution that saves sickness, and this caution ought to be in possession and exercise before middle life. It is so much easier to prevent serious sickness than it is to secure recovery from it. Hence it is that so many who are deficient in vigour in early life outlive the vigorous and the careless.

After middle life it is always to be recognised that a process of degeneration has begun. The tissues are less flexible and less easily nourished. Organs have not the activity of youth. Some of them have become more or less impaired. The safety is in recognising the fact and treating them accordingly. It is wonderful how the system often bears up under the partial disability of an organ or a part if there is adaptation to its weakness, and some compensation therefor. The enlarged heart freed from excitement and fatigue lasts a score of years. The weak stomach accepts the substituted digestion of the rest of the digestive tract or the outside digestion which chemistry offers. Even old age tends to last. The natural degeneration of tissues or vessels is too often hurried forward by spells of undue exertion or by too constant repose; while good food is needed and more frequently than in middle life, there is often error in the over-use of concentrated foods. There must be adaptation to our more retired and quiet life. The equable life makes the old person a comfort to himself and an example of healthful prudence to his friends.

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THE REST OF THE BRAIN.

Sleep is the rest of the brain—its great rest. A variation in work, a change of subject, is another kind of rest—the best rest often for the higher or intellectual centres; and an immense amount of mental labour can be safely undertaken if sufficient variety is secured. But in the end the brain demands sleep, and this is especially the case when the lower or more animal centres have been much used, as in children at play. Habit has a great deal to do with ensuring a good night's rest, the habit of going to bed at a regular hour. Hard mental work up to the hour of retiring may cause the loss of a night's rest, and it is a good plan to indulge in a little relaxation before bedtime, like a piece of light literature, a game, or some music. Trivial things may win slumber, such as lowering the pillow or turning its cold side, but artificial means of distracting thought have nearly invariably proved totally useless. Children require more sleep than grown people. A healthy baby for the first two months or so spends most of its time asleep. After that a baby should have at least two hours of sleep in the forenoon and one hour in the afternoon, and it is quite possible to teach almost an infant to to adopt this as a regular habit. Even to the age of four or five years a child should have one hour of sleep, or at least rest in bed before its dinner; and it should be put to bed at six or seven o'clock in the evening, and left undisturbed for twelve or fourteen hours. Up to the fifteenth year most young people require ten hours, and to the twentieth year nine hours. After that age every one finds out how much he or she requires, though as a general rule at least six to eight hours are necessary. Eight hours' sleep will prevent more nervous derangement in women than any medicines can cure. During growth there must be ample sleep if the brain is to develop to its full extent, and the more nervous, excitable, or precocious a child is, the longer sleep should it get if its intellectual progress is not to come to a premature standstill, or its life be cut short at an early age. The period of full maturity, with its maximum of mental activity, is the period of minimum demand for sleep, but old age reverts to the habit of childhood and passes much of its time in slumber.

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SACCHARINE.

As many people are by this time aware, saccharine is the most recent of the many substances extracted from coal tar. It shares this humble origin with salycilic, a host of fragrant ethers, and the entire series of lovely, though evanescent, aniline dyes. In, therefore, trying to prejudice the material by calling it "coal tar," those who employed that mode of argument might as well describe soda water as rain and lime, or melted snow and sulphuric acid, since all these, more or less deleterious materials are employed in the concoction of an extremely harmless beverage. But while dyes and physic have been extracted in abundance from the waste of gas works, until a few years ago an encumbrance instead of a profit, it was not until a German chemist hit upon saccharine that coal tar could be claimed as one of the raw materials of food. Indeed, its discovery was a simple accident. The chemist to whose researches we owe this substance—though, it may be added, his merits in this respect have been contested—lunching in his laboratory without taking the trouble to wash his hands, found that the bread he was eating had, where his soiled fingers touched it, an intensely sweet taste. Tracing the origin of this to the retort he had left, it was found that the sweetness was due to a new chemical evolved from a mass of coal tar. This was the now familiar saccharine. It has since been shewn to be three hundred times sweeter than cane sugar, and as it can be produced wholesale at from 20s. to 30s. per pound, it is clear that, so long as the supply of coal tar holds out, saccharine will be able to run sugar out of the market. The German brewers are employing it as a substitute for sugar in "priming" or sweetening beer, its value for this purpose being greatly incressed by the fact that not only is it so very sweet that a very little will suffice, but it also possesses the property of enabling the beer to be kept for a longer period than any but the strongest taps can be preserved under the present system.

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SPECIFIC GRAVITY.

Tables of specific gravity give the relative weights of equal bulks of different bodies, the standard being pure water. One *cubic inch* of water weighs 252½ grains, very nearly; hence the sp. gr. of a body multiplied by 252½ gives the weight in grains of a cubic inch of that body. The weight of a *cubic foot* of water is but little short of 1,000 ounces avoirdupois, therefore specific gravities indicate roughly the actual weights, in ounces, of cubic feet. Example: The sp. gr. of marble 2·700, weight of cubic foot about 2,700 ounces.

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SIGHT AND SMELL OF BIRDS.

A hawk can spy a lark upon a piece of earth almost exactly the same colour at twenty times the distance it is perceptible to a man or dog; a kite soaring out of human sight can still distinguish and pounce upon lizards and field mice on the ground; and the distance at which vultures and eagles can spy out their prey is almost incredible. Recent discoveries, and especially Darwin's observations, have inclined naturalists to the belief that birds of prey have not the acute sense of smell with which they were once accredited. There acute sight seems better to account for their actions, and as they appear to be guided by sight alone, as they never sniff at anything, but dart straight at the object of their desire. Their counterparts in the ocean, however, undoubtedly see and smell equally well, but are more guided by smell than sight. In both sharks and rays the eyes are good, and have a most distinct expansion; though since they scent their prey from a distance and swim up to it with great rapidity, "smell" as Lacepede says, "may be called their real eye." Smell, in Mr. Herbert Spencer's definition, is anticipatory taste, whilst the sight is anticipatory touch;

and the manner in which sight, as the dominating sense, is substituted for smell the higher the evolution of the animal, is remarkably interesting to follow, once the varieties of sight are understood, and both sight and smell are studied in connection with the particular habits of the creature for which they were designed. Turn where we will, sight and organs of sight are everywhere adapted in the most perfect manner to the necessities of the animal world; and in realising this fact, we believe the truth of the words: "The first wonder is the offspring of ignorance; the last is the parent of adoration."

WHERE DO WE STORE OUR MEMORIES?

We forget nothing. That is a bold statement, but I feel that I am stating a fact as positively as if I said two and two are four. We actually forget nothing, although sometimes I can't remember the number of a house, or you the name of someone you wish to introduce. In fact, there is an actual idiocy of forgetfulness about most people apparently; but the supposed annihiliation of the memory in such cases is only apparent and not actual.

Suddenly, as you are sitting alone, a memory will pop up and appear before you —a thing forgotten, as you believed, for years. *Where have you kept it?* If one could answer that question, perhaps he could solve the mystery of man's being. Where was that memory hidden? It is not vague or mysterious; it is no ghost. It is a living fact—a thing so curiously tangible that you feel as if you could clutch it. Yesterday you could not have recalled the fact that such things ever happened. To-day they stand before you as sharply defined as memories of yesterday could be.

They say that when people are resuscitated from drowning they speak of having "remembered their whole lives." Those who have been restored to sensibility after being hung tell the same tale.

A man who was apparently killed by a current of electricity was after a time restored to consciousness. He spoke of enjoying an exceeding happiness, such as he had never experienced before, and of remembering all that ever happened to him that was pleasant.

Where, meanwhile, have these memories slumbered? What are they made of to appear and disappear so mysteriously? And how can we be sure that the odd things little children say they remember, are all fancies? And when and where shall that comprehensive remembrance of all we have said, done, thought, or felt in our lives be given to us permanently? That it will be, some authorities strenuously maintain; and surely the remembrance of a good life might help to constitute a heaven—that of an evil one, perdition.

RUMINATING ANIMALS.

The great majority of ruminating animals get their food rapidly, give it a few cuts with their teeth, and swallow it. It goes to an interior receptacle, where it is moistened; this is very essential if it be dry hay. When the animal has filled his stomach, he masticates the food thus stowed away in his stomach, raising it cud by cud. When a portion is completely masticated, it passes to another receptacle, and the progress of digestion goes on. Thus an ox, if left to himself, will masticate all his food thus stowed away in his stomach. If he be pushed and worked hard, and does not have time to masticate, he falls off in flesh, his health is poor, his digestion incomplete. The horse, on the contrary, however much in a hurry he may be, must masticate each mouthful before he swallows it. A hungry ox let into a meadow will fill himself in twenty minutes, while the horse would want an hour and twenty minutes to take the same amount of grass. The ox, deer, sheep, goat, chamois, and rabbit, being the natural prey of ferocious beasts, are endowed with the extra stomach in which hastily to stow away the food without mastication. This may, perhaps, be regarded as a wise provision of nature, enabling them to sally forth where the food is plentiful, and in a short time fill themselves and retire to a place of safety to ruminate their food at their leisure.

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GLASS.

When or how the art of glass-making was first discovered is unknown; but that it must be of great antiquity is proved from glass beads and other ornaments being found with the bodies of Egyptian mummies. Pliny says that the art of glass-making was discovered by some shipwrecked Phœnician mariners, whose vessel was laden with fossil alkali, a component part of glass; that kindling a fire on the shore, to prepare some food, and placing their cooking-vessel on pieces of the substance just named, the same by the agency of the fire and its union with the alkali became vitrified; and hence, according to this authority, the discovery of the art of glass-making. The first manufactories of glass mentioned in history were at Tyre, an ancient Phœnician city on the coast of Syria. In the reign of Tiberius a company of glassmakers established themselves at Rome. At what time glass was introduced into England is uncertain, but in 1557 the finest sort of flint glass was manufactured at Crutched Friars in London.

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Miscellaneous.

STRIKES:

THEIR CAUSES AND CONSEQUENCES.

(Continued.)

Many strikes occur annually from a cause that is much to be regretted. The selection of a foreman is an extremely delicate task, and one that most manufacturers shrink from, until necessity compels them to do so. Under these circumstances it can scarcely be wondered at, if, in the hurry and press of business, many mistakes are made, and, too often, the least fitted is the one selected. As business men see it, to consult their employés in the matter would not be in conformity with their ideas of propriety, but still, if it were done, much of the friction and many of the causes of contention that agitate some concerns would be avoided. The workman who attends strictly to his own business does his work cheerfully, and has a kind word for his fellows, aids them by his advice, and often extends his help in the execution of difficult and disagreeable duties, secures the friendship and good will of his associates, is the best material from which to select a foreman, and yet such a man is rarely, if ever, selected.

But the type of man who generally secures the promotion is diametrically the opposite of the former. He is usually entirely selfish, never loses the opportunity to attract the attention of his superiors, and is constantly on the look out for occasions when he can perform some act that will still further elevate him in the opinion of his employers. When trouble comes he keeps aloof from his comrades, often urges them into difficulties, and is ready at all times to betray them, whenever, by so doing, he can secure his own elevation. In a word, he is a complete sycophant, and from such are foremen, too often, selected.

The elevation of such a man to a foremanship can be productive of but one result—discord. Scarcely is he inducted into his position ere he becomes inflated with self-importance at such an elevation, and soon forgets that he was ever associated with the workmen, and begins to indulge in a species of petty tyrannies at first, and if he finds that the workmen, his former associates, submit to them, he increases the severity of his demands until his tyrannies become unbearable, then comes revolt. To those of his comrades who have the best qualifications as workmen, his system is mostly directed, because he fears their usefulness to the concern will reach the office, and in that case the permanency of his foremanship may be put in jeopardy. He tolerates no rivals, and never loses an opportunity of making his employer believe that he is thoroughly alive to his interest, and is doing his level best to reduce the running expenses of the establishment to the last notch, but takes good care not to inform his employer that in his reduction of expenses he is robbing the workmen, which is, unfortunately, true in many cases.

Through close competition or some other cause, the art of producing and working of machinery at a nominal cost has been reduced to a science. The machinery is run at the highest rate of speed consistent with safety. The clang of machinery is deafening, men are bending over their work as if fearful to lose a stroke during working hours, every motion of the human frame is governed by the revolution of machinery, everything is strung to its utmost tension, and now is the time for the foreman to make himself solid with the superintendent, and he with the Company, who, it is discovered, is paying too much for his labour, as is evidenced by the weekly pay rolls, and in order to retain their trade a reduction of wages is a necessity. If the truth be told of them, the foreman took particular pains to urge the workmen to increased activity and then laughed at the men's discomfiture when the reductions took place.

In calling attention to these facts, it is not intended to charge that all foremen are to be classed as sycophants, for, happily, the tyrant is the exception and not the rule. If, by the publication of these facts, employers can be induced to look more closely into the characteristics of men, when seeking for foremen, and make their selections more upon the basis of merit and mechanical ability, combined with courage; to see that equal and exact justice is done to master and man, there is no doubt but many difficulties that are constantly arising in well regulated establishments, will be reduced to a minimum.

But, above all, be sure to remember that the safest man to place in the responsible position of foreman, is he who has the confidence and respect of his fellows, whose smile makes sunlight in the pathway of his duty, and not the blustering braggart that can swear like a pirate, and whose power is seldom feared and never respected. Every honest workman will obey the former cheerfully and serve him with fidelity, but to the latter he will only render such service as is forced from him, and if the firm becomes the sufferer, he consoles himself with the feeling that its management has none to blame but itself.

JOHN BRIGHT'S FIRST SPEECH.

The first speech in which Mr. John Bright displayed his latent powers as an orator, has not until recently been published in any biography, but Mr. William Robertson, author of "The Life and Times of the Right Hon. John Bright" tracedout and procured the old manuscript of it, shortly after the publication of the first edition of the above work, for insertion in his second. In December, 1833, Mr J. S. Buckingham, who at that time represented the town of Sheffield in Parliament, delivered a course of lectures in the old theatre in Toad Lane, Rochdale, on "Palestine and Egypt." On the evening of the last lecture, when Mr. Buckingham resumed his seat, Mr. John Bright finding that no other gentleman rose to propose a vote of thanks, stood up, and delivered the following speech. In the early part of it he showed signs of great nervousness, but, as he proceeded he gained confidence, and astonished his fellow-townsmen by his graphic and interesting survey of the scenes traversed by the lecturer.

"For the last five or six evenings" said Mr. Bright, "we have listened with intense and increasing delight to the eloquent addresses of the gentleman, the sound of whose voice still lingers in our ears, and before this numerous assembly separates I think there is one thing remains to be done, and though I am convinced it would have been better had someone older than myself undertaken to do it, still as there seemed no disposition on the part of those who surrounded me to mention it, I have presumed to bring it under your notice. Under the able guidance of an experienced traveller, we have visited the classical land of Egypt, the wonders of her splendid cities have been investigated, the tombs of her Pharaohs and their subjects have been explored. We have even ascended the giant pyramid, and from its summit have surveyed in imagination the splendid prospect, so beautifully, so poetically described to us, the glorious rising in the east, proclaiming the approach of day, the silvery moon sinking in the pathless waste of sand, as if unable to compare with his superior brilliancy. We have traversed the barren sands of Arabia, and have, as it were, feasted our eyes upon the beauties of the oases of the desert. We have admired the nobleness of the soul which so eminently characterizes the wandering tribes, and have paid our tribute of respect to that spirit of independence whose fire burns in their breasts as brightly now as in ages long gone by. We have heard with feelings of solemnity and of unspeakable interest, the animated description of the present condition of Palestine; we have viewed with astonishment the lofty cedar of Lebanon, the witness of a thousand years, and the unvarying fertility of Mount Hermon; we have trod the calm and peaceful retreats of the Mount of Olives, and have perambulated the streets of Jerusalem, the most renowed city on the face of the earth, and as we gazed on Calvary the recollection of the momentous transaction with which it will ever be associated, awakened in us feelings which it would be vain for me to attempt to describe. From the summit of a neighbouring hill, we have beheld Damascus in all its beauty, its fertile plain, its broad streams, its glittering minarets, its lofty domes, almost realizing to the fancy the existence of a paradise upon earth. Again we have wandered at leisure along the banks of those majestic, those magnificent streams, the Tigris and the Euphrates, and have felt sad at beholding the complete desolation of Nineveh and Babylon. We have journeyed on to Bagdad, a city whose very name is synonymous with splendour; we have admired the vastness and simplicity of its mosques, the variety of its caravansaries, the splendour of its baths, the extent of its bazaars, and I doubt not we have received impressions in some degree favourable as to the manners and customs of Eastern life. This evening we have penetrated into that grand country situated between the Indus and the Ganges, that land which our imagination has pictured as ever teeming with wealth.

Where from fountains ever flowing,
Indian realms their treasures pour.

We have seen how that wealth may be rendered available to England, and how the blessings of civilization and Christianity may be spread abroad in that vast empire. We have also had a clear view of that which to this country is most important of all— the immense field which there exists for the extension of British commerce, and for the consumption of British manufactures. I say then that for the instruction and delight we have received, our best thanks are due to the honourable gentleman, and I am sure that the sentiment will be responded to by every person now present, and that a forest of hands will attest unanimity of feeling on this subject. I shall therefore conclude by moving 'That the warm thanks of this meeting be presented to Mr. J. S. Buckingham for his kindness in coming among us, and that we tender him the assurance of our best wishes for his future prosperity and happiness.'"

The whole assembly applauded enthusiastically, for such command of language and descriptive powers in so young a man had taken them by surprise. Even Mr. Buckingham was so impressed that he said privately to Mr James Eckroyd, a tradesman who had taken a leading part in arranging for the lectures, "Mark my words, if that young man lives, he will become one of the greatest orators in England." How truly this prophecy has been realized all the world knows.

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BE MANLY.

"A domineering tone or a surly manner to equals and subordinates is the trait of small and ignorant minds," remarks an old commercial authority. "It is usually associated with cringing obsequiousness to superiors. Sometimes, however, it is the result of young men being placed in positions of a little brief authority, the duties of which they have not the intelligence and experience to properly and satisfactorily perform; and hence, to hide their ignorance and to keep up the appearance of dignity and importance, they are domineering in tone, surly in manner, egotistical and self-important in bearing. All these young men are measured by time, and are nearly always found wanting in the balance. They do not wear well; what is in them is on the surface, and is soon known. Clerks possessed of this spirit are never successful in life. They never get beyond third or fourth rate clerical positions. The fact is, put a second-class man in a first-class position and he will be a second-class man still. Positions do not make the man, but first-class men invariably make first-class positions. Courtesy, kindness, industry, honesty, truthfulness, close attention to one's duty, and the desire and ability to learn and to make the most judicious use of one's opportunities in the interests of one's employer, are the sure stepping stones to success.

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THE BONES OF COLUMBUS.

A correspondent says it is open to dispute whether, had the American showman been granted his prayer, he would have obtained the real bones of Columbus. It is all but certain, he says, that the so-called Mausoleum of Columbus, in the city of Santo Domingo, has long ceased to hold its most valuable treasure. "We know that when 'El Almirante' died at Valladolid—three hundred and eighty-two years ago—his body was laid in the Cathedral there, though soon afterwards it was transferred to the Carthusian Monastery of Las Cuevas, in Seville, where also the body of his son Diego was laid. In 1536, however, the remains of both father and son were exhumed and transferred to the Cathedral of Santa Domingo. Even there they were not to rest. For in 1795-96, on the cession of that island to the French—in whose possession it did not long remain—the august relics were again re-exhumed, and deposited with all due state and solemnity in the great church of Havana, where it is an article of belief on the part of every good Cuban that they still remain. No doubt the Dominicans scoff at the Havanese claim, and affirm, in language the severity of which ill becomes so sad a theme, that alone have the authentic Christoval Colon. How far this assertion is well-founded is never likely to be settled. The Cid's bones have been discovered in more than one church besides that of the Burgos Chapel, where they are now shewn to the passing tourist, irreverently heaped together in a rough coffin; and Shakespeare's grave has been desecrated. It is certain that the carelessness with which the tomb of Columbus was treated after his remains came to Hispaniola affords room for the Dominican contention that the body in Havana is that of somebody else. The

Dominicans continue to consider that there was a mistake in 1795, and that they have the authentic Columbus, and they were self-respecting enough to make money by leasing him to any Yankee showman."

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HOW A FAMOUS HYMN WAS WRITTEN.

A religious paper, *The Freeman*, gives the following account of how the favourite hymn "Just as I am" came to be written :—

One day a faithful minister, the pastor of a small church, met in the street a young girl, a member of his congregation, on her way to be fitted for a new dress for an approaching ball. As she told him her errand, he said to her, "I wish you would give up your life of vanity and become a Christian, and live a godly life. Will you not stay away from the ball because I wish you to do so?" She answered, "I wish you would mind your own business," and, bidding him good-bye, she went on her way.

Shortly afterwards she went to the ball, and danced all night, and, returning home, laid her weary head upon her pillow. But her conscience soon began to trouble her. She thought she had offended her best friend, the pastor, who cared for her soul. She was in great distress for three days. When she could bear it no longer, she went to her pastor, and told him how much she had been pained on account of the words she had spoken to him. "For three days," she said, "I have been the most wretched girl in the world, and now, oh that I were a Christian! I want to be happy. What must I do to be saved?"

The pastor, full of sympathy, fixed his eyes on the penitent young woman, and directed her to come to the Lamb of God just as she was. "What! just as I am?" she asked with astonishment; "I am one of the greatest sinners in the world. You certainly do not mean that God will accept me just as I am?" "That is just what I mean," said the minister, "God wishes you to come to Him just as you are." The young woman went home to her room, kneeled by her bed, and prayed God to accept her just as she was, and taking a pencil and paper, wrote under the holy influence, the beautiful hymn, beginning :—

Just as I am, without one plea,
But that Thy blood was shed for me.
And that Thou bid'st me come to Thee,
O Lamb of God, I come!

The young woman was Charlotte Elliot. The hymn was written in 1834.—*From the "Warheitszeude."*

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THE GENTLEMAN.

We often hear the question asked, "Who is a gentleman?" and in these pages we have endeavoured to reply; but to answer the query in a sentence is by no means easy. "To be a gentleman," says Bishop Donne, "does not depend on the tailor or the toilet. Blood will degenerate. Good clothes are not good habits." Hallam, the historian, makes the crusader to reappear in a later age as the cavalier, and, still later, as the gentleman. And so, indeed, the modern crusader, the Soldier of the Cross, is the Christian gentlemen, the Sir Phillip Sydney of the day, although he may only have the will, without the power, of giving the "cup of cold water."

In a Gloucestershire manor-house there is a quaint and admirable description of a true gentleman, written and framed and hung over the mantlepiece of a tapestried sitting-room. The delineation is called "The Portrait of a True Gentleman," and is as follows :—

"The True Gentleman is God's servant, the world's master, and his own man. Virtue is his business, Study his recreation, Contentment his rest, and Happiness his reward. God is his Father, Jesus Christ his Saviour, the Saints his brethren, and all that need him his friends. Devotion is his chaplain, Chastity his chamberlain, Sobriety his butler, Temperance his cook, Hospitality his housekeeper, Providence his Steward, Charity his treasurer, Piety his mistress of the house, and Discretion his porter, to let in or out, as most fit.

"Thus is his whole family made up of virtue, and he is the true master of the house. He is necessitated to take the world on his way to heaven; but he walks through it as fast as he can, and all his business by the way is to make himself and others happy. Take him in two words—a man, and a Christian."

A NOVEL REMEDY AGAINST BORES.

A land agent in the Northern States of America was excessively annoyed by the interruption of callers, to gratify whose idle curiosity he was obliged to leave his work. Walking down the street one day, a well-dressed female in a shop caught his eye, and, wondering why the lady tarried so long, he approached and discovered that the figure was a dummy. He passed on, meditating first about the figure, then by a natural association of ideas about women in general, and next about the politeness of Southerners to women, and just here an original idea struck him. He was sure that no one—at least, no Southerner—would attempt to interrupt him while he seemed to be talking to a woman. If a quick-sighted man like himself could mistake a dummy for a lady, why should not other people? No sooner thought than done. The figure was made and placed in his office. The land agent worked with his back to the door and his face to the figure. People came and looked and waited and walked away. The thing acted like a charm, and the few shillings for calico, buttons, hooks and eyes, and a chignon were amply repaid by the saving in the valuable time of the land agent.

Railway Items.

BOILER EXPLOSION ON THE NORTH-EASTERN RAILWAY.

The result of the inquiry made by Major-General Hutchinson, of the Board of Trade, into the cause of the boiler explosion which occurred on the 17th July, about seven miles from Shildon, on the Impasture Mineral Branch of the North-Eastern Railway, is as follows:—

In this case, while engine No. 590, a six-wheeled coupled goods engine and tender, drawing a train of 28 loaded coke and coal wagons and a brake-van, was proceeding on its journey at a speed of about 20 miles down a falling gradient of 1 in 200, the boiler of the engine exploded without the least warning.

The force of the explosion was severely felt on the footplate, and the driver was seriously injured and scalded in the head, eyes, and left side, the injury to his eyes having been also caused by fragments of the glass of the cabin windows. The fireman escaped with a severe shaking and a burn in his left arm.

The crank axle of the engine was broken off near the right end, and the right side of the adjacent framing forced outwards, and the engine was otherwise a good deal damaged. The middle plate of the boiler and a portion of the plate next the fire-box was blown away; a large piece of the plate next the fire-box was left hanging over the framing on the left side. The principal part of the middle plate, including the dome, was found on the left slope of the cutting in which the line runs, about 100 yards from the scene of the explosion, with the dome undermost. A second and smaller piece was picked up in a field on the right of the line, about 270 yards from the scene of the explosion, and about 240 yards distant from the line. Two other small pieces were afterwards found about 120 yards from the place of explosion close to the line, and one on either side of it.

The engine and train ran forward about 330 yards after the explosion, the right driving-wheel of the engine being the only one which was off the rails.

Owing to the serious injuries which the driver sustained, the inquiry had to be postponed till he was able to undergo examination, which he has only recently been well enough to do.

DESCRIPTION.

Goods engine No. 590 was built in the year 1879, and began running the same year, since which time and up to the date of the explosion it had run 220,705 miles.

It is an ordinary six-wheels coupled goods engine, and tender with inside cylinders.

The barrel of the boiler was telescopic in form, 11 feet 4 inches long, the outside diameter at the fire-box end being 4 feet 3¾ inches, and at the smoke-box end 4 feet 2 inches, barrel plates (Lowmoor), 7-16 inch thick; double riveted longitudinally and transversely, with a lap of 4 inches, the landings being outside. There were six plates in the barrel, the two centre ones being 3 feet 11¼ inches long, the centre of the right-hand longitudinal joint being 3 feet 1½ inch, and that of the left-hand one 1 foot 2 inches, vertically above the bottom of the boiler.

The boiler was provided with three safety valves, two spring balance-valves easing off at a pressure of 135 lbs., and a lock-valve at about 145 lbs., the working pressure being 140 lbs. The safety-valves had been examined by the inspector of safety-valves on June 28th, and found to be in good working order.

The boiler had last received extensive repairs in January, 1885, when the tubes had been taken out and renewed; the inside of the boiler was then thoroughly examined, and nothing found wrong with it.

It had not been tested with hydraulic pressure since it had been working, before which it had been subjected to a pressure of 195 lbs. to the square inch.

The engine had been last in the shops for slight repairs in April, 1887, when the lagging had been removed at the smoke-box end to repair a leak in the joint at the junction of the barrel and smoke-box, but no searching internal examination of the boiler could be made as the tubes had not been removed.

The boiler had been washed out on the morning before the accident, and the interior examined as far as was practicable with the aid of lamps. The result of this examination did not bring to light any defect.

It thus appears that the barrel of the boiler of engine No. 590, which had commenced working in 1879, and had run about 220,705 miles, exploded while the engine was running with a train of 28 loaded mineral wagons and a brake-van (12 less than its maximum load) at a speed of about 20 miles an hour down a falling gradient of 1 in 200, about seven miles from Shildon, where it had commenced its journey.

The driver, an experienced man of 29 years' service as such, and who had had charge of the engine for eight and a half years, states that it had been running about a mile with the steam slightly on, it having been previously shut off for two or three miles, the injector having been taken off when steam had been put on, when without the slightest warning, the explosion took place, the pressure-gauge having indicated 120 lbs. just before this; that steam had not been blowing off at the safety-valves the same morning, but had been the day before at 130 lbs.; that he had not observed any leaks since the engine had last come out of the shops. He felt a great crash upon his head and face, and thought he was sent flying he did know where. When he recovered, the engine was still in motion, and he thought he was on the tender; but he was quite blinded. Thinking the engine was off the rails, he managed to get down on to the ballast, and kept his feet, and the train stopped before it had completely passed him. As before stated, he was very seriously injured.

The fireman, who was sitting on a box on the left side of the foot-plate, was lifted off the box, and on coming to himself found he was on the foot-plate, on his feet, with his face to the tender. He ran on to the top of the tender, got on to the first truck, dropped off from it on to the ballast, and kept his feet, though the train was still in motion. He then had the presence of mind to jump on to the fourth wagon, and put down its brake, after which he went to the assistance of the driver, who had just jumped down.

A large piece, including nearly the whole of the middle plate, the dome, and part of the the plate next the fire-box, was torn along the horizontal joint on the left side of the boiler, and deposited on the left side of the line, 12 yards from the rail, and 97 yards from the place of explosion. If, as is probable, the rupture commenced at the horizontal joint, it would have seemed natural that the piece should have blown to the right rather than to the left, but it must have been owing to the blow by which the right end of the crank-axle was struck and broken, and the adjacent right framing was struck by the lower part of the plate, that its course was deflected and directed to the leit rather than to the left of the line. A triangular piece was picked up on the right of the line, instead of on the left, as might have been expected. A piece was turned down over the left frame, still attached to the rest of the plate next the fire-box.

From a careful inspection of the surfaces of fracture there is but little doubt that the explosion commenced at the fire-box end of the horizontal joint of the lower middle plate, there being evident signs of grooving along the inside of this joint, extending a considerable distance into the thickness of the metal. This grooving might possibly have been ascertained by a careful examination when the boiler was inspected internally in January, 1885. but it is very probable that it might not have commenced at that time.

With boilers made like this one with lap joints grooving is far more likely to be produced than with those made with butt joints, and I am glad to learn from the locomotive superintendent of the North-Eastern Railway that he is making all new boilers with butt joints.

It will be observed that this boiler had never been tested with hydraulic pressure since it commenced working in 1879. There is, I know, much difference of opinion among locomotive engineers as regards the value or otherwise of periodical tests of boilers by hydraulic pressure. Considering, however, the difficulty of ascertaining by inspection, even when the tubes are removed, the existence or non-existence of grooving in boilers with lap joints, and the impossibility of doing so unless the tubes are removed, it becomes a great question whether the advantages to be gained by periodical hydraulic tests do not outweigh any possible risk attending their use.

It is satisfactory to observe how few locomotive boiler explosions now occur compared with their former frequency, especially on the North-Eastern Railway. During the seven years ending in 1881 there had been no less than nine on this railway, whereas the one forming the subject of this report is the only one that has taken place during the past seven years.

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ITALIAN TRAIN ROBBERS.

A recent descent made simultaneously upon the employés of all the railways of northern and central Italy by the Italian police, has disclosed the startling fact that organised bands existed amongst those

those employés, and that it was owing to their excellent organization and expertness that so many robberies have been committed with impunity. Passengers have been found murdered and plundered in the compartments, and many letters and packages, containing money and valuables, have disappeared even from the mail vans. The public began to complain energetically of the miserable insecurity which had set in from the time railways were formed by private companies. In order to entrap the evildoers the sudden descent was made, the result being that a number of skeleton keys, jemmies, and every variety of tools required for the craft of the thief were found alike upon guards, porters, and others employed in the luggage offices. The greatest haul was made at Treviso, which seems to have been the head quarters of the bands. The complete success attending the cleverly planned operation will be hailed with the utmost satisfaction by travellers in Italy.—*Iron.*

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RAPID LOCOMOTIVE CONSTRUCTION.

The Pennsylvania Railroad officials recently conceived the idea that an entire locomotive could be built in less than twenty-four hours—the best time on record—which was made by the Baldwin Locomotive Works, of Philadelphia. Twenty hours was the given time. In sixteen hours and fifty minutes the engine was completed aud turned out of the shops ready for use. It is a class Alanthracite, weighing 110,000 lbs., and will be used in the New York division of the Pennsylvania Railroad.

The commencement was made at 7 a.m. on Monday, June 18th, 1888. By noon on the same day the boiler was in position; by 7 a.m. on Tuesday, June 19th, it was placed upon its wheels and the cab was put in position, and by 2.50 p.m. it was compleletely finished and in steam ready for trial after a total of 16 hours 50 minutes' work. This was a truly remarkable performance and speaks volumes for the organization of the Altoona shops.

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THE CONSUMPTION OF WOOD FOR RAILWAY SLEEPERS.

The six principal railway companies of France use more than 10,000 sleepers per day, or 3,650,000 per annum. These railways require 1,000 trees per day for sleepers alone. In the United States the consumption is much greater, amounting to about 15,000,000 sleepers a year, which is equivalent to the destruction of about 170,000 acres of forest. The annual consumption of sleepers by the railways of the world is estimated at 40,000,000. From these figures it is certain that the natural growth cannot keep pace with such a large consumption. Hence we have had during the last quarter of a century the frequent inundations and changes in atmospheric conditions. These and other considerations tend to the ultimate employment of metal for sleepers in place of wood.

◆

RAILWAY RECEIPTS.

The gross receipts of the 23 principal railways in the United Kingdom for the week ending December 2nd amounted, on 16,008¼ miles, to £1,202,032, and for the corresponding period of 1887, on 15,907¼ miles, to £1,175,440, an increase of 101 miles, or 0·6 per cent., and an increase of £26,592, or 2·2 per cent. The increases included £9,750 in the North Eastern Company's earnings; London and North Western, £8,370; Great Northern, £1,151; Lancashire and Yorkshire, £795. The decreases included Midland, £4,144.

Useful Hints.

TO CRYSTALIZE GRASSES.

Dissolve one pound of best, white pulverized alum over a slow fire, in one quart of pure, soft water. The beauty of the grasses depends on the pure whiteness of the crystals ; hence the mixture must be allowed to boil, and care must be taken that nothing gets in that can possibly stain it. After the alum is dissolved let the solution cool down to blood heat. Arrange the grasses in a new earthen bowl, pour the solution over them, cover up and set away for twenty-four hours. Take the grasses out carefully, dry them in the sun four or five hours, and arrange in vases prepared for them. When the grasses are formed into a bouquet before crystalizing, take a glazed earthen jar, and suspend the bouquet from a stick laid across the mouth of the jar, and pour on the solution. The alum water that remains may be reheated, tinged blue, purple, or scarlet, by a few drops of dye, and used again. All kinds of plants may be treated in the same way.

◆

TO CURE IN-GROWING TOE-NAIL.

We take the following remedy for a very common and very painful affliction from the *Boston Medical and Surgical Journal* :—"The patient on whom I first tried this plan was a young lady who had been unable to put on a shoe for several months, and decidedly the worst I have ever seen. The edge of the nail was deeply undermined, the granulations formed a high ridge, partly covered with the skin; and pus constantly oozed from the root of the nail. The whole toe was swollen and extremely painful and tender. My mode of proceeding was this:—I put a very small piece of tallow in a spoon, and heated it until it became very hot, and poured it on the granulations. The effect was almost magical. Pain and tenderness were at once relieved, and in a few days the granulations were all gone, the deceased parts dry and destitute of all feeling, and the edge of the nail exposed so as to admit of being pared away without any inconvenience. The cure was complete, and trouble never returned. I have tried the plan repeatedly since, with the same satisfactory results. The operation causes but little pain, if the tallow is properly heated. A repetition in some cases might be necessary, although I have never met with a case that did not yield to one application. It has now been proved, in many other cases, to be effectual, accomplishing in one minute, without pain, all that can be effected by the painful applications of nitrate of silver for several weeks."

◆

FIRE AND WATERPROOF CEMENT.

A cement that is fire and water proof is made of pulverised litharge 5 pounds, fine Paris white 2 pounds, yellow ochre 4 ounces, hemp (cut into shreds) half an ounce, all mixed to the density of thick putty with boiled linseed oil. This cement receipt was once sold for 1000 dollars cash, was lost, and the above is the result of an analysis of a sample.—*Independent Record.*

◆

TO BRIGHTEN TARNISHED BRASS AND COPPER.

Clean the brass by warming it and dipping in water charged with washing soda, then into clean water to remove the grease. Next dip in a bath of one part by measure of sulphuric acid, one part sal-ammoniac, two parts nitric acid, and four parts water. Dip for a moment, then dip in clear water, and dry in sawdust.

Humorous.

NEVER MORE.

He had just got his oyster shop opened to the public the other day, when in walked a man who asked:

"Got any raws?"

"Yes, sir."

"Extra large?"

"We have some of the largest oysters I ever saw."

The price was asked and given, and as it seemed to be perfectly satisfactory, the man ordered a dozen, and added:

"I've got a slight contraction of the muscles of the throat, and sometimes I choke. If anything happens to me run me to the door, where I can get the air, and then rush for a drink of water."

The caterer promised to observe the caution, but it was only when the twelfth and last oyster was taken in between two rows of teeth which stood out like ten-penny nails that anything happened. Then the eater suddenly raised one leg, his eyes bulged out, and he began to skip around like a goat dodging a club. The choke had come. The caterer seized him by the arm and ushered him to the door, and then hurried to the rear end of the restaurant for a glass of water. When he returned with it, half expecting to see the customer lying on the floor in the agonies of suffocation, no one was in sight. The man was not in the door, nor at the door, nor around the door. He was two blocks away, and the twelfth oyster had gone down to keep the company of the other eleven.

Just exactly another such thing won't happen in that place again. Some other man with a contracted throat may start in to play the game, but before he has eaten his second oyster he will be dispatched with a hickory club, and his body sent to some medical college to find where the loose spoke was.

SAM WELLERISMS.

"I've been blackberrying," as the man remarked when he returned from the funeral of an African potentate.

"It's my belief," as the parson observed after he had repeated the Athanasian Creed.

"That's the best thing I've heard for a long time," as the young man exclaimed when he had heard his old aunt's will read, in which he was left sole heir.

"I speak without bounds," as the man said in the House of Detention.

"I'm marking time," as the fellow remarked when he was repainting the face of the clock.

"I'm suffering from a gastric(k) disorder," as the householder observed when he found that his gas meter had been registering against him all the time he was at the seaside.

"I will bring them on soon, monsoon," as the Indian farmer said when he went out to look at his crops, at the commencement of the rainy season, and saw a big cloud forming overhead.

TURNING THE TABLES.

Alphouse Karr tells a nice little story of Auguste Romieu, a well-known writer on the *Figaro*, whose practical jokes made him famous all over Paris. One night, Romieu, having dressed himself for his part in a provincial costume, entered awkwardly a watchmaker's shop, and with a timid bow and an apology for disturbing the tradesman, began:

"Pardon, monsieur, but what are those little round things hanging up there?"

"Those are called watches."

"Watches! What are they for?"

"To tell the time of day."

"Why, they must be very handy. Do they cost much.

"From two hundred francs down to twenty-five.

"Bless me, I could afford to buy one! Does it take much trouble to make them go?"

"No; all you have to do is to wind them up every day—this way."

"That seems very easy; but when should I wind the watch—I think that is what you call it—up?"

"In the morning."

"In the morning—why?"

"Because you are always drunk at night, Mr. Romieu, and you'd break it if you tried to wind it up then!"

✣

TWO OLD-TIME LOVE-LETTERS.

In an old book, dated 1820, there is, says the "People's Companion," the following very curious love epistle. It affords an admirable play upon words:—

"Madame,—Most worthy of admiration! After long consideration and much meditation on the great reputation you possess in the nation, I have a strong inclination to become your relation. On your approbation of the declaration, I shall make preparation to remove my situation to a more convenient station, to profess my admiration, and if such oblation is worthy of observation and can obtain commiseration, it will be an aggrandization beyond all calculation of the joy and exultation of yours

Sans Dissimulation."

The following is the still more curious answer:—

"Sir,—I perused your oration with much deliberation at the great infatuation of your imagination to shew such veneration on so slight a foundation. But after examination and much serious contemplation I supposed your animation was the fruit of recreation or had sprung from ostentation to display your education by an odd enumeration, or rather multiplication, of words of the same termination, though of great variation in each respective signification. Now, without disputation, your laborious application in so tedious an occupation deserves commendation, and, thinking imitation a sufficient gratification, I am, without hesitation, yours

Mary Moderation."

RARE OLD WINE.

An Englishman happened to arrive at dinner-time at a foreign hotel, and expressed his wish to have a bottle of wine of some better quality than the wine of the country; in fact, he wanted something which could boast of having been some years in bottle. The landlord said he had the very thing in the cellar, and without delay produced a bottle with a label which certified to the contents being fourteen years old. The uncorking was gone through with a proper amount of ceremony; but, alas, the first thing to make its appearance was a live fly!

✣

PRESERVATION OF A FAVOURITE MINISTER.

A minister was called in to see a man who was very ill. After finishing his visit, as he was leaving the house, he said to the man's wife, "My good woman, do you not go to any church at all?" "Oh, yes, sir, we gang to the Barony Kirk." "Then why in the world did you send for me? Why didn't you send for Dr. Macleod?" "Na, na, sir, 'deed no; we wadna risk him. Do ye no ken it's a dangerous case of typhus?"

✣

A COLONEL'S HEROISM.

A story is told of the heroism displayed by a Kentucky colonel—a real colonel, who was out soldiering with the narrator. During the absence of the regimental surgeon one day the colonel was seized with a diligent discomfort in the region of the sword belt, and he was advised to drink a scoundrelly potion compounded of turpentine and water. He took it down with never a wink. "How did you like it, sir?" asked the major, with mock solicitude. "Bah!—it is nothing," said the hero of the performance, as tranquilly as he would have described the loss of a leg by a cannon-shot. "I could drink it without the turpentine."

Poetry.

THE DRIVER OF THE IRON HORSE.

Clad in labourer's garb, as he goes to his place,
Scan him closely and well ; can you see in his face
Any token of fear as he starts for the race,
No plume and no banner unfurled ?
Give him room, men of might, in the temple of fame
He is guiding a courser whose lungs are aflame,
And whom only a hand of the master can tame ;
A courser that moveth the world.

In the coaches behind there's a laughing refrain,
There's dalliance of lovers and counting of gain,
As into the night, in the van of the train,
He hurries his dangerous way.
'Tis the lightning express, not a moment to spare,
Though the fiend of destruction may turn in his lair,
And the demons of fate may be filling the air
With their hideous laughter for aye.

On, into the terrible gloom of the night,
On, over the waste, while that fierce eye of light
Brings the sinuous track, like a flash, into sight
With its chances of death ever near.
There's a train on the road that is coming as swift
With the dangers as thick from the flood and the drift,
And the curtains of night, as they lower and lift,
Seem to shiver with sorrow and fear.

With a scorn for the gathering terrors that lurk,
Like tigers a-crouch, in the fathomless murk,
The invincible steed rushes on to his work
With a savage all-conquering thrill.
Through chasms of darkness he plunges his way,
By bridges and stations his echoing neigh
May be heard. How he revels with glee in the terrible play
Of his speed, and his strength, and his will.

But the driver is watchful ; his mission is grand !
How he carries our lives in his muscular hand ;
How the courser obeys at his quiet command,
No matter what terrors he sees.
And ever alert to the peril in view,
With hand that is steady and heart that is true,
To our homes and our friends he is leading us through
In comfort, and safety, and ease.

How little we reck of the treasures that lay
Through our journey of life, scattered over the way,
Continual blessings, by night and by day,
Abundant, yet precious as air.
We think of the dead, slain in battle, with pride,
And their deeds of renown with us ever abide,
Yet forget to remember how Rafferty died
For the lives that were placed in his care.

Our fanciful heroes we laud to the skies,
While the real ones pass and re-pass, but our eyes
Seldom rest upon them while they live ; and each dies,
Toiling steadily on.
And ever the world worships tinsel and show,
Unheeding the pearls and the diamonds below ;
Unheeding the gifts wrought of labour and woe,
Till the toiler is gone.

THE GREAT WESTERN EXPRESS.

On we go, on we go,
With tremendous power,
Always would we travel so—
Fifty miles an hour.
Free from oscillation,
Swift and sure endeavour
To fly past every station,—
Broad gauge for ever!

On we go, on we go,
Quietly reclining;
Express cannot stop, you know,
So do not think of dining.
Open *Telegraph* or *Times*,
Con the sparkling leader,
Or (if a nap you want) the rhymes
Which send to sleep the reader.

You'd like to view the scenery—
Look sharp! and mount your glasses,
Brick making, steam machinery,
A farm house, sheep and asses.
That's a river we flew over.
With boats lying at the ferry,
And that's a field of clover—
We are travelling fast! oh, very!

Half-a-dozen ploughs
Working in one field,
Just as many cows
Grazing in the weald;
Two sportsmen with retrievers
For partridges are touting;
See! those labourers wave their beavers
How lustily they're shouting.

There's the town of Reading,
Passed before you look;
See the sunshine shedding
Diamonds on the brook.
That's a splendid church
Towering o'er the woodland,
And a school beneath a birch,—
This ought to be a good land.

On we go, on we go,
A mile of vapour steaming;
Now and then a little slow,
While the whistle's screaming.
"Clear the line for the express!"
Every signal dropping
Says, "All right!" they can't say less,
We cannot think of stopping.

Yonder's Bath and Clifton,
That is Kingswood School;
Oh, don't we get swift on!
And yet so calm and cool.
There is Bristol with its towers,
Grand Redcliffe, and the river;
Down from London in two hours—
Broad gauge for ever!

On we go, on we go,
Great Western speed is glorious;
Honour to Brunel and Co.,
And Stephenson victorious;
Always sure—never frightening—
What a bold endeavour
To overtake the lightning,
Broad gauge for ever.

B. Gouch.

* * *

LOOK AT HOME.

Should you feel inclined to censure
Faults you may in others view,
Ask your own life, ere you venture,
If that has not failings too.

Let not friendly vows be broken;
Rather strive a friend to gain;
Many a word in anger spoken
Finds its passage back again.

Do not then, in idle pleasure,
Trifle with a brother's fame,
Guard it as a valued treasure,
Sacred as your own good name.

Do not form opinions blindly,
Hastiness to trouble tends;
Those of whom we thought unkindly
Oft become our warmest friends.

* * *

EPITAPH ON A TROMBONE PLAYER.

The turf is heaped upon his breast;
He's ceased his labours;
He plays no more, he is at rest,
So are his neighbours.

Correspondence.

NOTICE TO CORRESPONDENTS.

We do not hold ourselves responsible for the opinions expressed by Correspondents.

We reserve to ourselves the right to publish or reject any correspondence.

Rejected correspondence will not be returned unless accompanied by a stamped envelope.

All correspondence to be written on one side of the paper only.

We shall be glad to receive articles of interest and information on Railway Work, Machinery, &c. (English or Foreign), interesting Stories of Railway experiences, information of accidents, or any subject of general interest.

All correspondence to be addressed to MR. T. G. SUNTER, General Secretary, 17, Mill Hill Chambers, Leeds.

To the Editor of the Associated Society of Locomotive Engineers' and Firemen's Journal.

TECHNICAL EDUCATION.

On Wednesday, November 7th, the members of the Cardiff Trades Council, who represent all the trade societies in the district, were kindly invited to take tea with Professor Viriamu Jones, Principal of the University College of South Wales, at the College. After his guests had partaken of the good things provided, Professor Jones explained the reasons that had actuated him in inviting the council to take tea with him—among them being his desire of a more intimate knowledge of the members composing the council, and through them, a more practical insight into the wants and aspirations of the working classes as regards technical education. He pointed out that many ways of reaching the artizan had been been tried, such as by lectures, establishment of evening classes, and erection of workshops at the college, with apparatus and tools pertaining to different trades, where precept would be supplemented by example. But the lectures were attended by very few, and the evening classes were for the most part composed of the day students, and not of those artizans and workmen who the designer most wished would enjoy the benefit of the instruction there provided. Such an experience had led him to think that there must be some way still untried by which to arrive at a solution of this problem, and he thought the solution must come from an important factor, the artizan. In response to a member of the council who advised a lecture by Principal Jones on the utility and advantages of technical education, he said he would rather not lecture the council at present, but wished the members of the council individually to lecture him, so that from their arguments *pro* and *con* he could evolve some practical way by which to advance the object he he had in view, viz.: the further and technical education of the artizan and working classes generally.

Mr. Lewis Williams, a member of the Cardiff School Board and a governor of the University, who for many years has been a warm and generous advocate of the education of the masses, also spoke to his wish that all should enjoy the benefits of the college without class distinction.

Mr. Whitmell, H. M. Inspector of Schools, also spoke to the desirability of artizans formulating some plan whereby those young people who had left school, and were just entering on their apprenticeships in the various trades, could be reached, with the view of their further education, so as to fit them for the highest position in the trade or profession they preferred.

It was said by members of the council, that among the working classes generally there was a prevailing feeling that they were debarred from participating in the educational benefits of the college by an almost impassable barrier; that admission was to be gained only by exceptional attainments, special interest, and adequate funds, and knowing that they could not command the funds or obtain the interest, they dismissed all hope from their minds, and many when passing the college would look in at the portal with a feeling of awe, as though it was part of another sphere, with which they not only had nothing in common, but to which they must not aspire, and pass on with the unspoken wish that they were born under more fortunate circumstances, so that they might enjoy the educational benefits of that awe-inspiring edifice.

After several members of the council had spoken to the necessity of further technical education, Principal Jones kindly led the way for an inspection of the college buildings. He gave several interesting experiments, to the edification of his appreciative audience, and after viewing the various class-rooms and workshops, the curriculum of which he fully explained, and the possibility of evening classes of artizans being established in conjunction therewith, he also expressed an opinion that in the near future, if the working classes earnestly took up the question of technical education, they may have one or more of their direct representatives in the governing board of the college.

A hearty vote of thanks, proposed by the president of the council, to Principal Jones for his generous hospitality and kind entertainment, and to Mr. S. Williams for his warm championship of the working classes, was carried with acclamation. Both gentlemen having responded, then terminated a very enjoyable, and let us hope, an eventful visit.

The question may be asked, what is technical education? Now I take it that technical education means, theoretical precept combined with practical example. As an illustration—a youth having completed his elementary education, and having decided as to which trade he prefers, enters on his apprenticeship, or he may prefer engine driving, and having obtained a position as fireman on a locomotive steam engine, learns that the engine is composed of so much iron, copper, brass, etc., fitted together, and that a quantity of fuel put into a furnace surrounded by water, will generate sufficient steam to propel the machine. But this knowledge is insufficient to make him a practical engineer. He must know the properties of steam, the evaporating qualities of different coals, how the steam acts on the piston, the valve arrangement, expansion, lap and lead, and their differences, and what at present he has but meagre chance of learning, viz.: the different constituents of iron, brass, copper, etc.; their different degrees of variation under similar conditions of temperature, and the laws governing those differences, or the law governing the combustion of fuel and the resultant generation of steam under various climatic differences. This in my opinion is the technical part of an engineman's education which is essential he should learn if he wishes to become an efficient engineer of the future and keep pace with this progressive age. Attendance at evening classes, when practicable, where would be taught the theory of mechanics, with practical illustrations, combined with the practical knowledge obtained on the footplate, would tend to that happy consummation and redound to the credit of the teacher, the benefit of the pupil and his employer.

But how best to secure the attention of the young workman to the necessity of further education?

I should say, by the elder workmen of our societies obtaining, where practicable, the aid and co-operation of the principals and governing bodies of our educational institutions in combating the feeling that the colleges are not for "such as us," and in making the fact of the evening classes being held for the working men more generally known; by means of circular or otherwise, at the various trade societies meetings; and by making those classes attractive as well as instructive.

If I am incorrect in my premises, I shall be most happy to receive correction and instruction upon the points raised, through the columns of our *Journal*, with the kind permission of the editor.

I am, etc.,

CATHAYS. C. H.

THE PROPOSED ORPHAN FUND.

Sir,—There has been a considerable amount of expression of opinion in your columns *re*-the formation of an Orphan Fund. I had hoped we should have succeeded in having such a fund attached to our noble Society, to have commenced in January, 1889, but as far as I can see there does not seem any prospect of such a fund being started in the very near future. I am aware there are those who have objections, but I fail to see that they can be well founded if the fund were optional for members whether they joined or not, and the fund to be kept separate from the other funds of the Society. I believe such a fund is a stern necessity, and would increase our members, and as Christmas time is fast approaching, a season of the year when we usually think of the poor and needy, the widow and orphan, I would suggest, as we meet around our Christmas hearths with our families and friends, that we should give our proposed Orphan Fund some consideration; also what a struggle it would be for our families if the bread winner were taken from them. I think, sir, if we were in earnest in the matter, a considerable amount of money may be raised which would give the executive and officers of the Society such encouragement that an Orphan Fund would be established at a not very distant period.

Yours truly,

A Branch Sec.

VALPARAISO, CHILI, *Sep.* 22, 1888.

Dear Friend,—I was very pleased to receive your long and welcome letter, it was indeed a treat to me to receive such a letter from an old friend. I was also pleased to see by the *Journals* which you sent (and for which accept my thanks), that the Society is making headway, instead of being nipped in the bud, as some persons prophecied it would be, when the late dispute took place upon the Midland railway, and I hope that we shall learn at least one lesson from it, viz., not to trust those who, either from lack of foresight or through meanness, do not make any preparation for emergencies. I refer to non-society men. I have instructed my brother to pay a subscription to keep up my connection with the Society. You will, no doubt, have heard of the sad death of poor Gerald Blackwell, which occurred on Aug. 6th, his body not being recovered until Aug. 11th. On that date I asked the foreman to give me permission to go and search for the bodies, as you will doubtless be aware that Blackwell's mate and a native driver were also lost. My request having been granted, I rode to Calera with a passenger train, and then I walked about eight miles, passing over one place (for a distance of fifty or sixty yards), where the sleepers hung to the rails by the dogs, and the bank had been washed from under them, leaving a chasm about fifteen feet deep. I felt a bit queer, I can assure you, as I got towards the centre, but I kept testing the sleepers separately with a stick before putting my foot on them, and by keeping one foot along the rails and the other on the sleepers, I crossed in safety. This mode of procedure I had to repeat over several other dangerous places, after which I obtained a ride on a ballast engine for a short distance, then walked on to Llai Llai, a distance of two miles, but could not get any further that night in the direction of my search. But upon arrival at Valparaiso I was pleased to hear that the foreman had received a telegram to the effect that Blackwell's body had been found. So the following day I went on an engine with a friend or two and some persons with two coffins, but of course could not get all the way on the engine, and as we walked past the scene of the accident, the bogie wheels of Blackwell's engine were all that could be seen of it. Upon arrival at Taltal we found that J. Crump and other friends had already placed the body in a coffin they had brought with them. We then conveyed the body to Santiago, where it was buried the next evening, most of the foreign workmen following it to the grave. The bodies of the native driver and Blackwell's fireman were not found until three weeks after the accident, and were in a very bad state. The water has now been drained off and the engine can be seen lying bottom upwards, but only the tank framing of engine 32 can be seen, which seems rather mysterious, but I think that the probable explanation is, that a whirlpool must have been formed and made a deep hole, into which the engine has dropped and got covered with sand. No attempt has been made, so far, to get the engines out, but I daresay something of the kind will be done shortly. I am sending some photos of the scene of accident. I can assure you I miss poor Gerald sadly, he was such a nice young fellow and we shared the same room here. Mrs. Harper and children arrived here on Tuesday, the 4th, but instead of being met by her husband, we had some sad news to inform her, viz., that Jim had that day been removed to the hospital suffering from typhoid fever. I can assure you that this was a great blow to her but she bore up well under the circumstances, and, although grave doubts were entertained as to his recovery, I am thankful to say that he is now progressing favourably. Crump is in first-rate health, and Thornhill is now piloting, and the rest of the Nottingham men are pretty well. Hoping that you and all the old friends are well,

I remain,
Yours sincerely,
A. Wiggs.

Valparaiso, Chili, Late of Nottingham.

AMBULANCE WORK.

Pontypool Branch.

Sir,—I did not think that ambulance work was so lightly appreciated by enginemen and firemen as our friend "Anxious One" seems to intimate. I was under the impression that ambulance members were everywhere to be found, but it is just possible that I may not have looked beyond our own district, for I do not think any accident could happen in or around our locality without some member of St. John's being on the spot in a very short time, and who would know how to act until the arrival of a medical man, and I would urge upon all our members the necessity of undergoing a course of instruction, so that they may be in a position to render first aid to the injured when called upon. I am sending you answers to questions 1 and 2 in our October *Journal*, and it will afford me much pleasure to do my best in answering the questions that may from time to time appear in its pages.

I am, yours truly,

Patella.

* * *

QUERIES.

Sir,—Would you kindly allow me space in your valuable *Journal* to ask a few questions on ambulance work. Would any of your ambulance readers answer me the following questions :

No. 1.—What ought an ambulance pupil to constantly bear in mind ?

No. 2.—If you have a patient with symptoms of apoplexy, but bleeding from the nose or ears, what do you expect, and how would you treat the case ?

No. 3.—What structure is contained in the spinal column ?

No. 4.—What are capillaries, and what takes place in them ?

No. 5.—How would you proceed in a case of hanging from the neck?

An answer will oblige

Yours truly,

SUBCLAVIAN.

◆

The correspondent signing himself "Patella," sent us some very good answers to Ambulance Queries, but they unfortunately arrived too late for insertion in our November issue. We shall be pleased to hear of the progress made by the classes connected with our branches, also an account of any accident that may occur where our members render assistance, giving the nature of injury and method of treatment.

◆

ANSWERS TO QUERIES.

In answer to Query 3 in November *Journal*:—The arm would be helpless; crepitus could be felt; the arm would have lost its natural shape, that is, by the breaking of the bone in the arm the muscles would draw it up, thus making it shorter, and the arm would also be easily movable at the seat of fracture. Treatment.—Apply three or four padded splints to the arm, from the shoulder to the elbow, and put on a small arm sling, it not being advisable to use a large arm sling in such an accident, as it would have a tendency to push the elbow up.

Query 4. INJURED DRIVER.—I should at once try to arrest the bleeding by putting a pad in the hollow of the elbow, bend the fore-arm up to the upper-arm and tie it with a handkerchief or bandage. By so doing the artery would be bent, and the pad would press on the artery as it lay on the end of the arm bone, if that did not stop the bleeding I should apply a tourniquet to the brachial artery, bind up the stump, that is, make a hand bandage and put on a large arm sling, having the arm well elevated.

Yours faithfully.

Society News.

KING'S CROSS BRANCH.

Sir,—A mass meeting of enginemen and firemen was held on Nov. 4th, under the auspices of the King's Cross Branch of the A.S.L.E. & F., at the City of London Hotel, to hear a lecture by Mr. E. Gobert, C.E. (Hon. Member), upon continuous railway brakes. Mr. Clement E. Stretton, the Society's consulting engineer, occupied the chair, who, after alluding to the subject as an interesting and important one, as an efficient automatic continuous brake was a life saving appliance, called upon Mr. Gobert to deliver his address. That gentleman, on rising, met with a hearty reception, after which he proceeded with his lecture, which was full of interest to all present, and which frequently evoked applause, it having been delivered in a masterly manner, and some striking facts and figures given in favour of the Westinghouse brake. Mr. Stretton then alluded to some points in Mr. Gobert's address, and gave the members present an opportunity of asking any questions they might feel disposed. Several having been put and answered, it was unanimously resolved that the best thanks of the meeting be given to Mr. Gobert for his able and instructive lecture; also to Mr. Stretton for his attendance and services in the chair. Messrs. Gobert and Stretton, having suitably replied, Mr. Gobert promised to attend and address them again, when due notice will be given to our members.

A resolution was also unanimously carried urging upon all members to support the Society Monthly Journal.

Three new members were then enrolled, and a very successful meeting brought to a close.

I remain,

Yours fraternally,

F. GREEN, *Branch Sec.*

SWANSEA BRANCH.

Sir,—Our last monthly meeting was held at Oram's Coffee Tavern, Swansea, on Nov. 25th, and one new member enrolled. To tell you that it was well attended will be nothing strange to you, as the zeal of the men at this station, in reference to Society matters, cannot be questioned, as nearly every engineman and fireman have become enrolled under our banner.

I am,

Yours fraternally,

J. James, *Branch Sec.*

STRATFORD BRANCH.

Sir,—We are continuing to make progress at this branch, having made three new members at our last meeting, and I feel certain that we shall be enabled to shew you a splendid return in the new year, if we are spared, as the men are now fully alive to the necessity of being united in a Society composed of men of their own calling, and I hope, ere long, that Stratford will become one of the strongholds of the A.S.L.E. & F. If it be a truism that there's nothing succeeds like success, we shall not have long to wait, as our success in the last few months is an accomplished fact.

I remain,

Yours fraternally,

W. Stewart, *Branch Sec.*

LEEDS BRANCH.

Sir,—In my previous report I said that I hoped to be enabled to report a further increase after our next meeting, and I am pleased to say that two of the men who promised to join us have been as good as their word, as they were admitted at our last meeting , and I hope to continue sending, shewing an increase for each meeting night for some time to come.

Yours truly,

J. C., *Branch Sec.*

CHESTER BRANCH.

Sir,—I was very pleased to see in our last *Journal* that new branches had been opened at Normanton, Wigan, and Carmarthen. So far as our branch is concerned, I am full of hope, as the men are beginning to see the necessity of belonging to our Society, and we made five new members at our last two meetings.

I am, yours truly,

T. Preston, *Branch Sec.*

NORMANTON BRANCH.

Sir,—I feel more confident than ever of the success of our undertaking at this station, as we have never had a club meeting without making members since the opening of our branch. Our numerical strength was increased by three new members at our last club meeting. I trust that this state of things may continue until we have the whole, or at least the greater part of the men in this district, enrolled under our banner.

I remain, yours fraternally.

Geo. H. Hirst, *Branch Sec.*

KING'S CROSS BRANCH.

Sir,—Our monthly meeting was held on Sunday, December 2nd. There was a very fair muster of members, including Mr. Gobert, hon. member, who again addressed the meeting on "Automatic Brakes," answering several questions put to him, which gave great satisfaction to all present. Mr. Gobert also gave a brief account of his connection with the Westinghouse brake when on the Continent. Two new members were enrolled. A vote of thanks to Mr. Gobert brought a very good meeting to a close.

Yours truly,

F. Green, *Sec.*

King's Cross Branch.

OPENING OF A NEW BRANCH AT ABERDARE.

A general meeting of enginemen and firemen was held under the auspices of the A.S.L.E. and F., at the Cardiff Castle Coffee Tavern, Aberdare, on Sunday, December 9th, 1888. Mr. T. Ball, the organising secretary, attended, and gave a most explicit and stirring address upon the objects and benefits of the Society, the need for such an organisation, its progress, and prospects for the future. Mr. Harding, of Pontypool, then made a few remarks, after which Mr. Ball declared the branch open, twenty-four persons having decided to become members. Several members of various branches also intimated their willingness to be transferred to the Aberdare branch. The election of officers then took place, after which a vote of thanks was accorded Mr. Ball for his stirring address, and the meeting brought to a close.

Yours truly,

W. Derbyshire, *Branch Sec.*

Result of the Prize Drawing for C. Pinnock, engine driver, of the Kentish Town Branch of the Associated Society of Locomotive Engineers and Firemen :—

No. 1	...	3,139
,, 2	...	6,968
,, 3	...	6,872
,, 4	...	2,334
,, 5	...	4,754
,, 6	...	991
,, 7	...	4,638
,, 8	...	2,380
,, 9	...	699
,, 10	...	3,634
,, 11	...	1,639
,, 12	...	5,373
,, 13	...	7,365
,, 14	...	6,503

J. Robinson, *Hon. Sec.*,
76, Wellesley Road,
London, N.W.

BRANCH MEETING HOUSES.

Sheffield.
Albion Inn, Johnson Street, Wicker. Alternate Sundays.

Pontypool.
Hanbury Hotel, Griffiths Town, Newport, Mon.

Neath.
Three Cranes Inn, Wind Street, Neath. Alternate Sundays, at 7.30 p.m.

Leeds.
Prince of Wales Hotel, Mill Hill. Last Sunday in the month, 6.30 p.m.

Liverpool.
American Tavern, Byrles Street, Toxteth Park. Held fortnightly.

Bradford.
Granby Hotel, Union Street, Bradford. First Sunday in month.

Llanelly.
Neptune Hotel, New Dock, Llanelly.

Sandhills.
Brown Cow, Walton-on-the-Hill. Alternate Sundays.

Swansea.
Monthly—Landore Coffee Tavern. Saturday, at 8.30 p.m.
Quarterly—Oram's Coffee Tavern, Wind Street, Swansea.

Nottingham.
Mission Room, Queen's Walk, Nottingham. Every Monday at 8 p.m.

Bristol.
Phœnix Hotel, Totterdown. Every fourth Sunday at 7 p.m.

Plymouth.
At Mr. Sleeman's, 31, Harwell Street. Last Sunday in Quarter at 6.30 p.m.

York.
Adelphi Hotel, Railway Street, York. Alternate Sundays at 8 p.m.

Paddington.
Builders' Arms, Westbourne Park, London. Every third Sunday.

Newport.
New Bridge Inn, Bridge Street. Alternate Sundays, from May 6th.

Bow.
City Arms, Devons Road, Bromley. Fortnightly, on Fridays.

Openshaw.
Drovers' Arms, Ashton Road, Openshaw. Alternate Sundays at 7.30 p.m.

Mexborough.
South Yorkshire Hotel, Mexborough. Last Sunday in the month at 7.0 p.m.

Stockport.
Nicholson's Arms, Lancashire Hill. Last Sunday in the month at 6.30 p.m.

Birmingham.
Small Heath Hotel, Coventry Road. Alternate Sundays.

Battersea.
The Two Brothers, New Road, Battersea, London.

Retford.
Oddfellows' Arms, London Road, South Retford. Monthly at 8 p.m.

Lincoln.
Arcade Coffee Tavern, Lincoln. Last Sunday in the month.

Stratford.
Railway Inn, Angel Place, Stratford, London.

Wolverhampton.
Gladstone Inn, North Road, Wolverhampton. Meetings held monthly.

Grimsby.
Friendly Society Hall, Lower Spring Street. Alternate Sundays at 10 a.m.

Birkenhead.
Borough Hotel, Birkenhead. Meetings alternate Sundays.

Reading.
Blagrave Arms, Blagrave Road, Reading. Meetings Monthly, at 8 p.m.

Blackburn.
Dolphin Hotel, Blackburn.

Peterborough.
Pavilion Hotel, Park Road.

Stourbridge.
At Mr. Barnetts, The Mitre Hotel, Stourbridge. Monthly, Sundays.

Manchester.
Tower Hotel, Cathedral Yard. Every alternate Sunday at 7.0 p.m.

Tondu.
Llynvi Arms, Tondu, South Wales.

King's Cross.
The City of London Hotel, York Road Cattle Market, London. Meeting nights for year—Dec. 2nd, Dec. 16th.

Cardiff.
Great Western Coffee Tavern. Last Sunday in the month, at 3.0 p.m.

Chester.
Mrs. E. Cooper's Ermine Hotel. Every alternate Sunday after September 9th, at 7.30 p.m.

Exeter.
New Market Inn, Goldsmith Street, Exeter.

Worcester.
The Black Horse, Lowesmoor, Worcester. Every third Sunday from Oct. 28th.

Normanton.
The White Swan Inn, Normanton. Alternate Mondays at 10.30 a.m.

Wigan.
The Rock Hotel, Warrington Road, Ince.

Carmarthen.

Oxford.
The Robin Hood Inn, Oxford. Last Sunday in the month at 7.0 p.m.

Branch Secretaries will oblige by sending us the time and place of their Meeting Houses.

LIST OF BRANCHES.

We have now branches at the following places:—

Sheffield
Neath
Plymouth
Exeter
Oxford
Toton
Lincoln
Liverpool
Retford
Gloucester
Llanelly
Mexborough
Nottingham
Newport
Pontypool
Cardiff
Swansea
Skipton
Grimsby
York
Peterboro'
Bradford
Openshaw
Stockport
Leeds
Sandhills
Wolverh'ton
Bristol
Carnforth
Birmingham

LONDON BRANCHES.

Paddington
Kentish Town
Bow
Battersea
King's Cross
Stratford

* * *

BRANCHES OPENED THIS YEAR.

Reading
Manchester
Tondu
Carmarthen
Birkenhead
Blackburn
Chester
Wigan
Stourbridge
Worcester
Normanton
Aberdare

* * *

HONORARY MEMBERS ADMITTED IN 1888.

Messrs. Tippetts and Sons, Solicitors, Maiden Lane, London, E.C.

Mr. A. Maxwell, Duke of Clarence, St. Pancras Road, London.

Mr. L. Beaumont, Adelphi Hotel, Railway Street, York.

Thomas Lough, Esq., 5, Newton Grove, Bedford Park. Chiswick.

Mr. F. Ward, Kings's Cross, London.

Mr. G. F. Broach, City of London Hotel, York Road, London.

Mr. F. Orum, Proprietor of Restaurant, 52, Wind Street, Swansea.

Cooper, Ermine Hotel, Chester.

Mr. T. Smith, Leicester.

E. Gobert, Esq., C.E., London.
Gladstone Inn, North Road, Wolverhampton.

LOCOMOTIVE DEVELOPMENT.

COMPILED FOR THE

ASSOCIATED SOCIETY OF LOCOMOTIVE ENGINEERS AND FIREMEN,

BY

CLEMENT E. STRETTON,

Consulting Engineer to the Society.

THE name "locomotive" engine is derived from two Latin words, *locus*, a place, and *motio*, motion; consequently, a locomotive engine is an engine capable of moving itself from place to place.

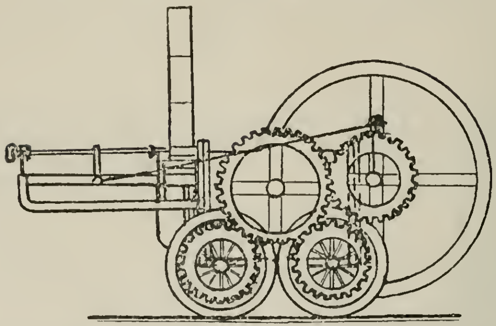
It is a well-known truth that great and important improvements in both railway and other industries are not the result of the work of one man, but of many minds; therefore it frequently occurs that the man who is able to work out the details and bring an improvement to a practical success is not the first inventor of the idea, and it is a matter of regret to both engineers and railway servants that no one book has ever been published giving a full and complete history of the early development of the locomotive engine, showing exactly the part performed by each inventor. The quantity of information which is known and available is enormous, but it is unfortunately distributed over hundreds of books, articles, and papers; and frequently railway companies even now discover, amongst old documents, drawings and details of engines which for years have been unknown and forgotten.

In a short pamphlet like the present it is not to be supposed that the *whole* subject can be dealt with at great length, but probably nothing will show our readers the gradual improvement in the locomotive more than a few illustrations, which we shall now place before them, and which, unless otherwise stated, are drawn to a scale of one-eighth of an inch equal one foot.

The power of steam was known to Hero of Alexandria about 200 B.C., or fully 2,000 years ago, and the book he then wrote treated of the expansive force of steam, and described the cylinder, piston, slide-valve, and common clack-valve. Although steam was *known*, no attempts appear to have been made to turn it to useful effect even in stationary engines until 250 years ago.

There were several "suggestions" and "models" of carriages worked by steam, but it was not until the year 1803 that the first tramroad or railway locomotive engine was constructed. This was built by Richard Trevithick with money provided by his cousin Vivian, and is here illustrated.

THE FIRST LOCOMOTIVE, 1803



Trevithick is without doubt "the father of the locomotive." He employed high-pressure steam, smooth flat wheels, and conveyed the exhaust steam from the cylinder to the chimney by a pipe; the boiler was 6 feet in length, and contained a return flue-tube, the chimney being at the same end as the fire-door. This engine had one cylinder placed horizontally, 8 inches diameter, the stroke being extremely long, 4 feet 6 inches.

On the 24th February, 1804, this engine was tried upon the Penydarran cast-iron plate-way, or tramroad, and conveyed trucks containing ten tons of bar iron and about seventy persons for a distance of nine miles to Merthyr Tydvil.

Trevithick does not appear to have followed up the development of the locomotive, but left to others the perfecting of the excellent principles which he introduced; probably it is on this account that he has never received that great credit to which he is justly entitled for the construction of the first locomotive engine which ever ran on rails.

Mr. John Blenkinsop, the proprietor of the Middleton Colliery, near Leeds, decided during the year 1811 to convey the coal over his tramroad to that town by means of a locomotive engine instead of horses, and gave an order to Matthew Murray, an engineer, of Leeds, to commence the construction of such an engine. Both Murray and Blenkinsop were under the impression that sufficient adhesion could not be obtained between smooth wheels and smooth rails, they, therefore, adopted a rack-rail and cog-wheel gear; the power developed by the steam cylinders was communicated to the large cog or driving wheel, the four ordinary wheels of the engine being simply supporting wheels, and taking no part in the working of the engine. This engine was completed by Murray and ran its first trip upon the Middleton line in August, 1812, and together with others of a similar design conveyed coal from Middleton to Leeds for several years.

Messrs. Chapman, in December, 1811, obtained a patent for a method of working the locomotive engine by means of a chain stretched along the whole length of a tramroad, and secured at each end; this chain was wound round a grooved pulley upon the engine, consequently when the grooved pulley was put in motion the engine wound itself along the chain, in fact Chapman's chain acted the same purpose as Murray and Blenkinsop's rack-rail. Chapman's chain was tried upon the Hetton Colliery Tramroad, near Newcastle on-Tyne, but proved a failure.

William Hedley, in February, 1813, tried his first locomotive, which was intended for use upon Mr. Blackett's Wylam Colliery line, but it was short of steam, and was a failure; however, Mr. Blackett had great faith in steam power, and instructed Hedley to build a second engine; this was completed in May, 1813, and tried on the Wylam Line, it was named "Puffing Billy." This engine had a wrought-iron boiler, with a return flue, the chimney being placed at the same end as the fire-door (the same as Trevithick's engine), it had two vertical cylinders, the piston-rods being connected to beams, from which motion was communicated to the four smooth driving wheels by means of toothed gear, the exhaust steam from the cylinders was discharged by pipes into the chimney, but it first passed through a cylindrical reservoir, from which it escaped gradually, the object being to keep down the noise. Hedley's "Puffing Billy" remained at work upon the Wylam Line till 1862, when it was removed to the South Kensington Museum.

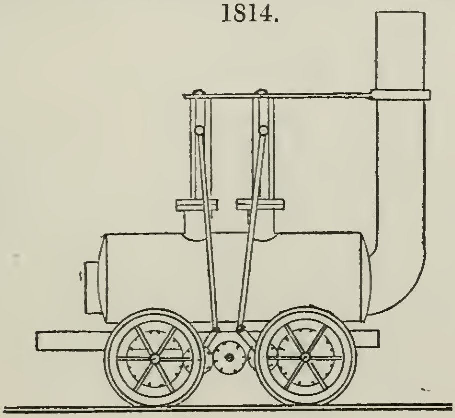
It is important to observe that Hedley and Blackett (like Trevithick) were aware that smooth wheels upon smooth rails had sufficient adhesion they did not therefore follow in the steps of Murray and Blenkinsop

Mr. Brunton, of the Butterley Ironworks, Derbyshire, obtained a patent in 1813 for a mode of accomplishing the locomotion of an engine without the aid of the adhesion of the wheels; it was, in fact, a "steam-horse," having a pair of hind-legs actuated by steam cylinders but it proved a failure.

George Stephenson, the enginewright at the Killingworth Colliery near Newcastle-on-Tyne, had been anxiously studying the subject during the time that these various experiments had been in progress, and on one occasion, after witnessing the performance of an engine, expressed his opinion that "he could make a better engine than that."

Towards the close of the year 1813 Lord Ravensworth and partners in the Killingworth Colliery intrusted George Stephenson, the enginewright, with money to construct a locomotive engine for their railway. The engine was built at the West Moor workshops of the colliery, and after being about ten months in hand, was placed upon the Killingworth Railway, and tried for the first time on the 25th July, 1814, and was named or generally known as "Blutcher."

GEORGE STEPHENSON'S FIRST ENGINE.
1814.



The engine ran upon four smooth wheels of 3 feet diameter, placed 5 feet apart between centres. The boiler was 8 feet long, 34 inches diameter, having a flue-tube passing through it of 20 inches diameter. The cylinders were 8 inches diameter, 24 inches stroke, and placed vertically half within the boiler. The power of the two cylinders was communicated by connecting-rods to cranks on the spindles of the small spur-wheels, which spur-wheels in turn actuated the large cog-wheels on the engine axles; the small central spur-wheel was employed to maintain the cranks at right angles to each other. On the 27th July, 1814, "Blutcher" conveyed a train of eight wagons of coal, weighing 30 tons, up a gradient of 1 in 450 at a speed of four miles an hour, and afterwards continued regularly at work.

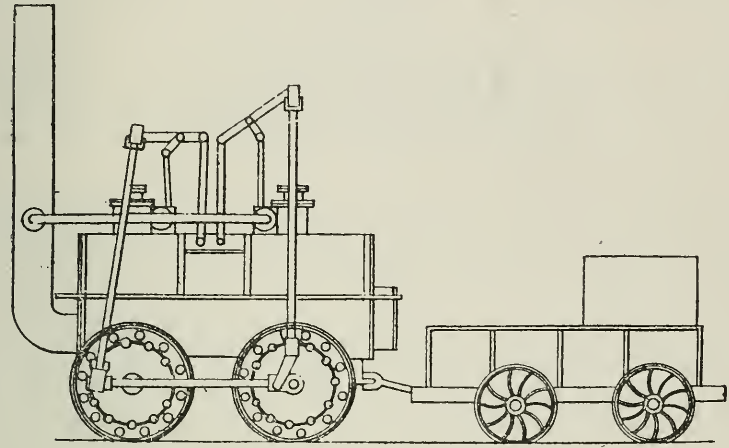
The engine was not provided with springs, and the cogwheels becoming worn, Stephenson was intrusted with money to construct a second engine. This was built in 1815, under a patent granted to Stephenson and Dodd, 28th February, 1815. In this second engine the connecting-rods were attached direct to crank-pins upon the wheels. The exhaust steam was discharged into the chimney by two blast pipes, and the four wheels of this engine were coupled by rods. These rods, however, were not placed upon the crank-pins outside the wheels, but two double-cranked axles were employed having the cranks at right angles to each other, the two coupling rods were therefore placed upon these inside cranks, between the wheels; this arrangement was afterwards abandoned, and Stephenson adopted an endless chain passing over a toothed wheel upon each axle.

In 1817, the Duke of Portland ordered an engine from George Stephenson, similar to the Killingworth pattern, for use on his Kilmarnock and Troon tramroad. The engine worked successfully, and conveyed the coal traffic from the collieries to the Troon harbour, but its use was afterwards given up, as the cast-iron tram plates were found too weak to carry any engine.

The locomotives working on the Killingworth line having proved satisfactory, the owners of the Hetton Colliery in 1819 decided to alter their old horse tramroad into a locomotive line, they therefore employed George Stephenson, as engineer, to lay out the line for them and construct the engines. At the opening of the Hetton railway on the 18th November, 1822, there were five of Stephenson's engines at work thereon. Thus far it will be observed by our readers that locomotive engines had simply been employed by private colliery owners for conveyance of coal upon their own lines. The Stockton and Darlington "*public* railway" scheme was therefore one of the important turning points in locomotive history. George Stephenson was appointed engineer, and application was made to Parliament in 1818; twice the Bill was rejected, but it passed in 1821, and on Tuesday, 27th September, 1825, this, the first public railway in the world, was opened for traffic. The engine which drew the first train—and in fact the only engine the Company possessed at that time—was constructed by Messrs. Stephenson and Co. for the Stockton and Darlington line in 1825, and it was named "Locomotion."

We have before us a handbill, issued September, 1825, announcing the intended opening of the first public railway, in which this engine "Locomotion" is proudly and emphatically described as "The Company's Locomotive Engine and the Engine's tender," which we here illustrate.

STOCKTON AND DARLINGTON RAILWAY.
"LOCOMOTION," No. 1.
1825.



This engine ran upon four wheels, had one large flue, or tube, through the boiler, the cylinders being placed vertically and half within the boiler; the exhaust steam from the cylinders was discharged into the chimney by two blast pipes, one for each cylinder, that one for the left-hand-side being plainly shown upon our illustration, the dimensions being as follows:—

Cylinders	10 inches diameter.
Stroke...	24 inches.
Wheels	4 feet diameter.
Boiler	10 feet in length.
Boiler	4 feet diameter.
Boiler pressure	25 lbs. sq. in.
Weight of engine in working trim,	6½ tons.
Weight of tender, fully loaded,	1½ tons.
Total	8 tons.

"Locomotion" worked upon the Stockton and Darlington line from 27th September, 1825, to 1841, and after its retirement from active service, it was placed, and still remains, upon a pedestal at the entrance to the North Road Station, Darlington.

"Locomotion," it should be mentioned, is still in good working order, and capable of being put in steam. It headed the procession on the opening of the Middlesborough and Redcar railway; it was taken from its pedestal and worked upon the Darlington section of the North-

Eastern Railway at the Stockton and Darlington Jubilee, September, 1875. It was sent to the Philadelphia Exhibition, 1876, and will also be remembered by those of our readers who attended the "Stephenson Centenary," 1881, and the Liverpool Exhibition, 1886, and it is now engaging very considerable attention at the Paris Exhibition, 1889.

From an old official statement drawn up by the Stockton and Darlington Company, we find that during the five months between the 1st July and 1st December, 1833, "Locomotion" ran 5,300 miles, and carried 287,896 tons gross one mile; amount of repairs, £41 19s. 7d.; and the cost of repairs per ton gross carried one mile equalled 0·035 of a penny.

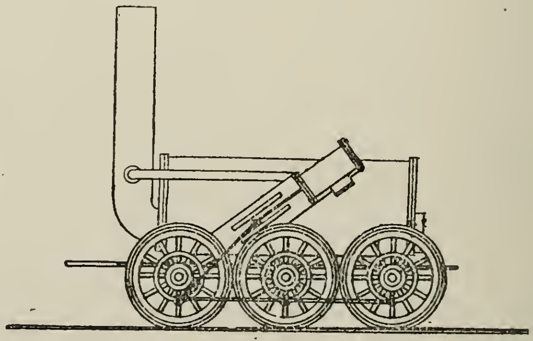
Following the opening of the Stockton and Darlington line, Stephenson constructed for it three other engines similar to the "Locomotion;" they were named and numbered "Hope, 2," "Black Diamond, 3," Diligence, 4."

At this time, Timothy Hackworth, who had been a foreman at Stephenson's works, Newcastle, was transferred to the Stockton and Darlington Railway Company's Engine-shed at Shildon, and became locomotive foreman.

Messrs. Gilkes, Wilson & Co., of Leeds, during the early part of the year 1826, designed and constructed an engine, "No. 5," for the Stockton and Darlington Railway; this firm considered that outside coupling-rods were an objection, and to avoid their use they placed the engine upon four wheels, and employed four cylinders, two to each pair.

During the year 1826 Messrs. Stephenson and Co. built an engine for the Stockton and Darlington Railway, named "Experiment," being "No. 6" in the books of that Company.

STOCKTON AND DARLINGTON RAILWAY.
"EXPERIMENT," No. 6.
1826.

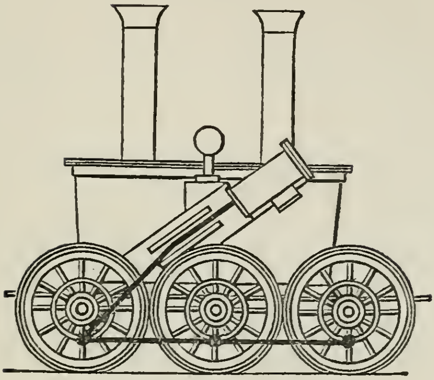


This engine had six-coupled wheels, and outside, inclined cylinders:

Cylinders, 9 inches diameter; stroke, 24 inches; diameter of wheels, 4 feet; boiler, 10 feet long, 4 feet diameter. The boiler contained two fire-flue tubes; 1 foot 6 inches diameter. The exhaust steam was conveyed from the cylinders to the chimney by two blast pipes, one for each cylinder.

"TWIN SISTERS."

1827.



Stephenson and Co. in 1827 built an engine named "Twin Sisters;" it was employed as a ballast engine at the construction of the Liverpool and Manchester Railway, and as it was required to work over very severe temporary gradients it was considered best to construct it with twin boilers, in order to ensure that water should at all times cover the tops of the fire-boxes. The engine ran upon six coupled wheels of four feet diameter, the cylinders being placed "outside" in an inclined position. Two blast-pipes were employed, one for each chimney.

"Twin Sisters" was known as the "Liverpool Coke Engine," as it worked trains of coal and coke to that city for Mr. Hulton, who contracted to supply the railway company with locomotive fuel.

We have previously referred to the "four-cylinder" engine, No. 5, built by Gilkes, Wilson and Co. for the Stockton and Darlington Railway; this engine was found to work very unsatisfactorily, and it was also very seriously damaged by a collision at Stockton. Timothy Hackworth therefore, in 1827, obtained the authority of the directors to remodel and rebuild it. The boiler was 13 feet long, and 4 feet diameter, and into this, Hackworth introduced a return flue-tube, similar to those previously employed by Trevithick and by Hedley.

The engine thus rebuilt was named the "Royal George," No. 5, and commenced work October, 1827.

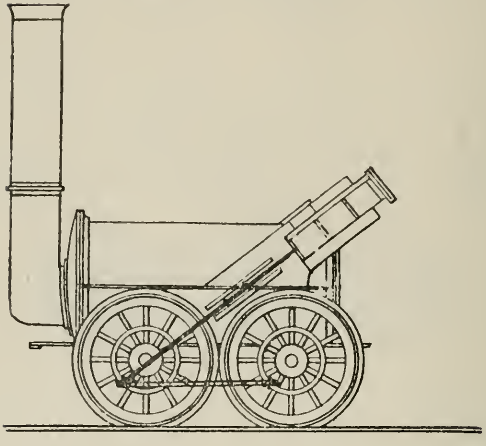
It had then six coupled wheels, outside vertical cylinders, the fire-door and chimney both at the leading end, two tenders being provided, one at each end of the engine, the exhaust steam being discharged into the chimney by a pipe. During the five months between 1st July and 1st December, 1833, the "Royal George" ran 700 miles, being under repair 121 days, the cost of repairs during that period being £161 7s. 8d., or 0·828 of a penny per ton of gross load carried one mile.

Stephenson and Co. in 1828 constructed a four-wheeled coupled engine named the "Lancashire Witch," for the Bolton and Leigh Railway; the cylinders were outside and inclined.

BOLTON AND LEIGH RAILWAY.

‘LANCASHIRE WITCH.”

1828.



Cylinders	9 inches diameter.
Stroke	24 inches.
Diameter of wheels	4 feet.
Boiler	9 feet long.
Boiler	4 feet diameter.

The boiler contained two fire-tubes, or flues, 1 foot 6 inches diameter.
Heating surface of flues, 66 square feet.
Four-wheeled tender.

The “Lancashire Witch” was employed first as a ballast engine at the construction of the Bolton and Leigh Line, and it was found by experiment that this engine conveyed 58 tons up a gradient of 1 in 432 at a speed of $8\frac{8}{10}$ miles an hour; it afterwards continued to work traffic for several years, but was ultimately sent to the “scrap heap.”

Messrs. Foster, Rastrick, and Co., of Stourbridge, in 1829 constructed two engines, one named “Agenoria,” the other the “Stourbridge Lion”; this latter engine was the first locomotive ever tried on rails in America.

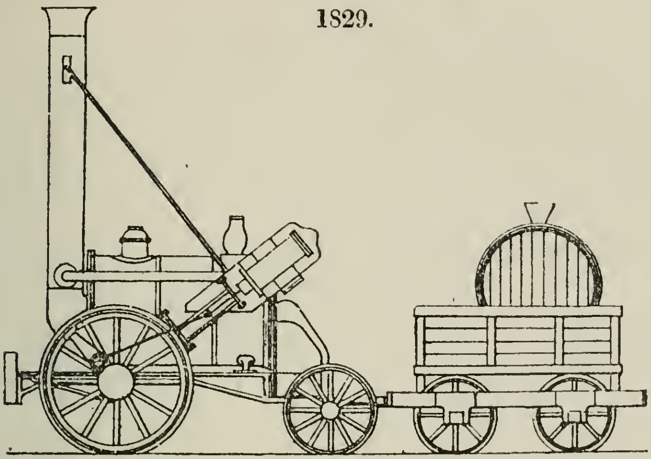
The Liverpool and Manchester has been truly designated as the Grand British Experimental Railway. George Stephenson was in this case also appointed engineer, and the line was opened to the public 15th September, 1830. Some time before the opening, the question of locomotive, or fixed engines and ropes, naturally came before the directors, as it was necessary to arrange for working the line, they, therefore, decided to employ Messrs. Walker and Rastrick, engineers, to make a tour of inspection to examine all the railways then at work; but, notwithstanding the reports, the directors did not feel able to come to a decision, when one of their number—Mr. Harrison—proposed “That a reward be publicly offered for the most likely mode of effecting their object,” and it was resolved to offer a prize of £500 for the best engine.

The trial took place on the Manchester side of Rainhill bridge, upon a level portion of line, and lasted from the 8th to the 14th October, 1829. Three engines competed for the prize, namely:

ENGINE.	MAKER.
The Rocket	G. Stephenson.
The Novelty	Braithwaite and Erickson.
The Sans Pareil	T. Hackworth.

The "Rocket" satisfactorily performed all the tests required by the judges and the prize was consequently awarded to Stephenson.

LIVERPOOL AND MANCHESTER RAILWAY.
"ROCKET."
1829.



The dimensions of the "Rocket" were as follows:—

Cylinders, diameter	8 in.
,, stroke	$16\frac{1}{2}$ in.
Driving-wheels, diameter	4 ft. $8\frac{1}{2}$ inches.
Boiler	6 ft. long.
,, ...	3 ft. 4 in. diam.
Pressure of steam in the boiler	50lbs. per sq. in.
Fire-box	2 ft. long inside.
,, ...	3 ft. broad ,,
,, ...	3 ft. deep ,,
Tubes, number	25
,, diameter	3 in.
,, heating surface	117·75 sq. ft.
Fire-box, ,, ...	20 sq. ft.
Total	137·75 sq. ft.
Area of fire-grate	6 sq. ft.
Weight of engine in working trim	4 tons 5 cwts.
Weight of tender, loaded	3 tons 4 cwts.
Total	7 tons 9 cwts.

The maximum speed attained by the "Rocket" at the Rainhill trials was 29 miles an hour.

This engine, although crude in appearance, possessed all those essential features which are necessary to the success of a locomotive—namely, the tubular boiler, direct connection made between the piston and the crank-pin on the driving-wheel, and last, but by no means least, the blast-pipes in the chimney, there being one pipe for each cylinder, as in the engine of 1815 and the "Locomotion" of 1825.

Our readers will not fail to observe that so little progress had the locomotive made in public favour that even in the year 1829 the directors of the Liverpool and Manchester Railway were divided in opinion as to fixed engines and ropes, horses and locomotives, and had not the locomotive engine proved itself a success at Rainhill, the result would have been the introduction of other means of working that line.

It is hardly necessary for us to mention that the "Rocket" is still preserved in the South Kensington Museum.

It will therefore be seen that although George Stephenson was not, and of course never claimed to be, the inventor of the locomotive, still he it was who in 1829, at Rainhill, settled the question and made the locomotive a practical success, and thereby led to the introduction of railways throughout the world.

Messrs. Braithwaite and Ericsson's engine "Novelty," ran upon four wheels, and had a combined verticle and horizontal boiler; bellows were employed to force air through the fire. In this engine, motion was communicated from the piston-rod to the wheels by means of a bell-crank. The "Novelty" broke down and failed at Rainhill.

Timothy Hackworth's engine, the "Sanspareil," ran upon four coupled wheels of 4 feet 6 inches diameter. The boiler was 6 feet long, and 4 feet 2 inches diameter, containing a return flue tube, the chimney being placed at the same end of the engine as the fire-door. The cylinders were 7 inches diameter, and the stroke 18 inches, placed vertically one on each side of the boiler, immediately above one of the pairs of wheels; the exhaust steam from the cylinders was discharged into the chimney by a blast pipe.

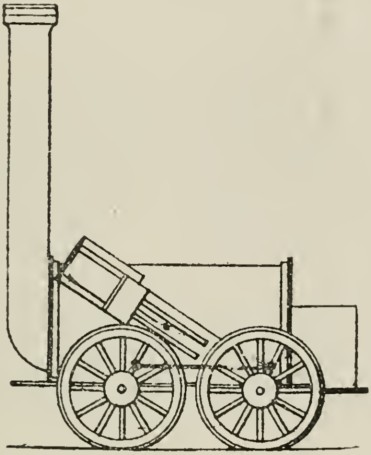
When the "Sanspareil" was brought forward for trial at Rainhill, the judges found that it did not comply with the conditions issued, being of greater weight than was to be allowed to be placed upon four wheels, the engine therefore should have been upon six wheels. Strictly speaking, it was considered that Hackworth's engine was therefore excluded from competing for the prize, but the judges wisely decided to put the engine through the same trial as the others, however, it broke down and failed to obtain the prize. The "Sanspareil" worked upon the Bolton and Leigh railway until 1844, and is now placed in the South Kensington Museum.

At the conclusion of the Rainhill trials and the success of the "Rocket," Stephenson received orders to build seven other engines, to be ready for the opening of the Liverpool and Manchester railway. They were constructed during the year 1830, and were very similar in design to the "Rocket." They were named—"Meteor," 2; Comet," 3;

"Arrow," 4; "Dart," 5; "Phœnix," 6; "North Star," 7,; and "Northumbrian," 8. These were all "outside" cylinder engines.

The Canterbury and Whitstable railway was opened on the 3rd May, 1830, the first train being worked by the Company's only locomotive, which had been built by Stephenson & Co., and was named "Invicta," which we here illustrate.

CANTERBURY AND WHITSTABLE RAILWAY.
"INVICTA."
1830.



Cylinders	10 inches diameter.
Stroke	18 inches.
Boiler	10 feet long.
Boiler	3 feet 4 inches diam.
Pressure	40 lbs. per square inch.
Wheels	4 feet diameter.
Wheel-base	5 feet.

The boiler contains a flue tube 20 inches diam.
The tender ran on four wheels.

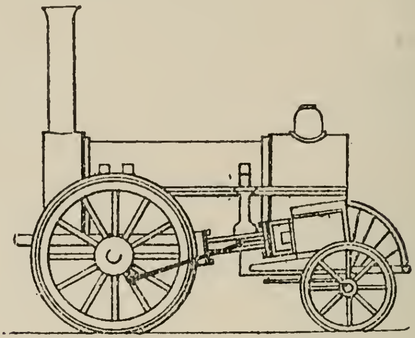
This ancient engine is preserved by the South-Eastern Railway Company, at its Ashford Works, where a few years ago we examined its construction, and it was sent to the Darlington Jubilee, 1875, and to the George Stephenson Centenary, 1881.

The Liverpool and Manchester railway was opened on the 15th September, 1830, upon which occasion the Company's eight engines and trains, and about 600 people, started in a procession from Liverpool in the following order:—

Name of Engine.	Driven by
"Northumbrian"	George Stephenson.
"Phœnix"	Robert Stephenson.
"North Star"	R. Stephenson, Senr. (brother of George).
"Rocket"	Joseph Locke.
"Dart"	Thomas L. Gooch.
"Comet"	William Allcard.
"Arrow"	Frederick Swanwick.
"Meteor"	Anthony Harding.

The engine which opened the Liverpool and Manchester railway was therefore the

"NORTHUMBRIAN," No. 8.
LIVERPOOL AND MANCHESTER RAILWAY.
1830.



This engine, it will be observed, had a smoke-box, and the cylinders were placed "outside," but nearly horizontally. The driving wheels, as in the "Rocket," and six other engines named, were placed in front. The following are the dimensions of the "Northumbrian":—

Cylinders	11in. diameter.
Stroke	16in.
Between centres of cylinders	5 ft. 8in.
Driving wheels	5ft. diameter.
Small wheels	2ft. 8in. diameter.
Wheel base	7ft. 6in.
Boiler	6ft. 6in. long.
Boiler	3ft. diameter.
Tubes, 132	1⅝in. diameter.
Heating surface of tubes	379 sq. ft.
,, ,, firebox	32·75 ,,
Total	411·75 ,,
Area of fire-grate	6·11 ,,
Weight in working trim	7 tons 6 cwt. 3 qrs.
Weight on driving wheels	4 ,, 0 ,, 1 ,,

The tender ran on four wheels.

It may be mentioned that on the opening day, when Mr. Huskisson was knocked down and run over at Parkside by the "Rocket," he was conveyed by the "Northumbrian" to Eccles, 15 miles in 25 minutes, or 36 miles per hour.

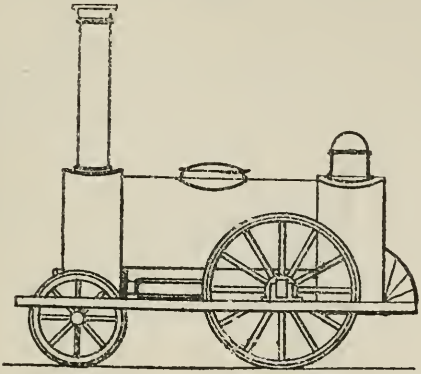
On the 16th September, 1830, when the regular traffic of the line commenced, the "Northumbrian" conveyed a train of 130 passengers from Liverpool to Manchester (Liverpool Road Station), a distance of 30 miles, 53 chains, in an hour and fifty minutes.

Following the opening of the line, Stephenson on the 4th October, 1830, placed a new engine upon the

LIVERPOOL AND MANCHESTER RAILWAY.

"PLANET," No. 9.

1830.



The engine was a striking improvement upon all Stephenson's previous ones. The cylinders were placed "inside" under the smokebox, the driving wheels were placed at the trailing end of the engine, and a double-cranked axle was employed, similar in every respect to one of those previously used for coupling the engine of 1815.

The dimensions of the "Planet" were as follows:—

Cylinders	11 inches diameter.
Stroke	16 inches.
Between centres of cylinders	2 feet 6¾ ins.
Leading wheels	3 feet diameter.
Driving wheels	5 feet ,,
Boiler	6 feet 6 ins. long.
Boiler	3 feet diameter.
129 tubes	1⅝ ins. ,,
Heating surface of tubes	370·41 square feet.
,, ,, firebox	37·25 ,,
Total	407·66 ,,
Area of firegrate	6·50 ,,
Weight in working trim	8 tons 0 cwts. 0 qrs.
On driving wheels...	5 ,, 2 ,, 2 ,,

This engine had also the usual four-wheeled tender, which weighed four tons fully loaded.

On the 23rd November, 1830, the "Planet" worked a special train to convey voters from Manchester to Liverpool for an election, the official report states that "the time of setting out was delayed, rendering it necessary to use extraordinary despatch, in order to convey the voters to Liverpool in time"—the journey was performed in 60 minutes, including a stop of two minutes on the road for water.

On Saturday, 4th December, 1830, the "Planet" drew a mixed train of passengers and goods weighing 76 tons (exclusive of the weight of the engine and tender) from Liverpool to Manchester in 2 hours, 54 minutes, including three stoppages of 5 minutes each for water and oiling. This train ran at a rate of 16½ miles an hour down the Sutton incline, and its greatest speed on the level was 15½ miles an hour.

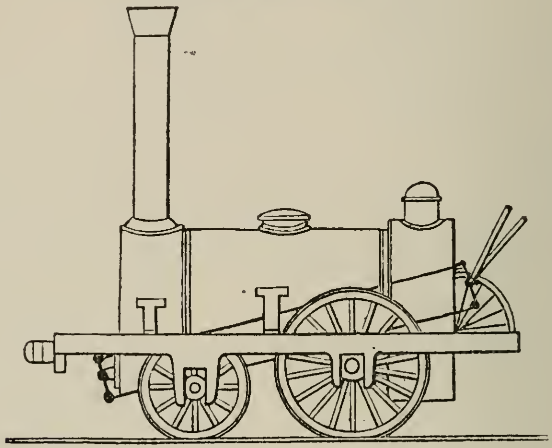
From another official report we find that between the 16th September and 7th December, 1830, the engines conveyed 50,000 passengers a distance of 28,620 miles, or 954 trips from Liverpool to Manchester.

The "Mercury," No. 11, was constructed by R. Stephenson and Co., December, 1830. This engine, it will be seen was of the "Planet" type, with the improvement that the engine frame was raised so as to be *above* the driving axle.

LIVERPOOL AND MANCHESTER RAILWAY.

"MERCURY," No. 11.

December, 1830.



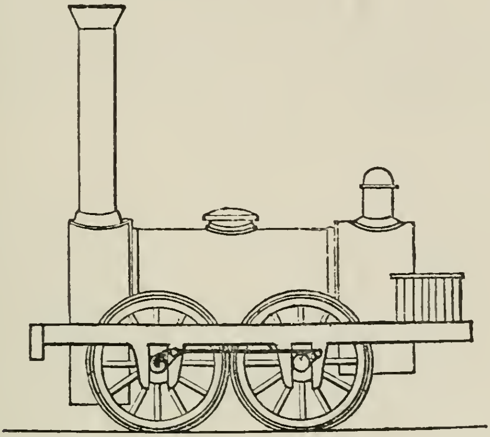
Diameter of cylinders	11 inches.
Length of stroke	16 inches.
Diameter of leading wheels	3 feet.
Diameter of driving wheels	5 feet.
Length of barrel of boiler	6 ft. 6 ins.
Diameter of boiler	3 feet.
Number of tubes	84
Diameter of tubes	1⅝ inches.
Wheel base	5 ft. 3 in.
Weight of engine in working order	9 tons.
Weight of tender fully loaded	4 tons.
Total	13 tons.

The "Planet" class of engine, as developed in the "Mercury," became the standard pattern of English four-wheeled passenger locomotives, and was copied in America and other countries shortly afterwards.

During the year 1830 Mr. Edward Bury, engineer, of Liverpool, introduced his, afterwards well known, class of four-wheeled engine, in which he employed his bar arrangement of framing, which is in general use to this day in America; and Timothy Hackworth placed the "Globe" upon the Stockton and Darlington Railway having an inside frame, inside cylinders, and four coupled wheels.

For the first few months after the opening of the Liverpool and Manchester Railway, some mixed trains of passengers and goods appear to have run daily, drawn by the "single" engines of the Rocket and Planet classes; but as the goods traffic gradually increased it became necessary to work "goods" trains, and R. Stephenson and Co., in January, 1831, placed upon the line two goods engines which "had been specially constructed and were described as of extraordinary power"; they were named "Samson," No. 13, and "Goliath," No. 15.

LIVERPOOL AND MANCHESTER RAILWAY.
"SAMSON," No. 13.
JANUARY, 1831.



Our readers will not fail to observe that practically the "Samson" and "Goliath" were a four-wheels coupled development of the "Mercury," having—

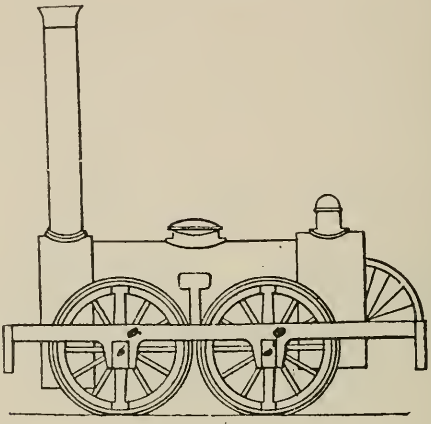
Cylinders	14 inches diameter.
Stroke	16 inches in length.
Diameter of coupled wheels ...	4 feet 6 inches.
Diameter of boiler	3 feet 6 inches.
Length of boiler barrel	7 feet.
Number of tubes	140.
Diameter of tubes	$1\frac{5}{8}$ inches.
Heating surface of firebox	40·20 square feet.
Heating surface of tubes	416·90 square feet.
Total...	457·10 square feet.
Weight of engine in working order	10 tons.
Weight of tender fully loaded ...	4 tons.
Total...	14 tons.

The "Samson," in February, 1831, "accomplished the great feat," it is officially recorded, of conveying a goods train of 164 tons (exclusive of weight of engine and tender) from Liverpool to Manchester in two hours and a half—the maximum speed being twenty miles an hour, and the consumption of coke was reduced to only about a third of a pound per ton per mile.

During the time the "Samson" and "Goliath" were under construction, another engine of the same class was built by Stephenson for the Hudson and Mohawk Railway, U.S.A., named "John Bull," and it was sent to America in 1831.

The Glasgow and Garnskirk Railway was opened in 1831, the first train being drawn by the company's engine named "George Stephenson," which had been constructed at Newcastle, and was driven by Mr. George Stephenson upon that occasion.

GLASGOW AND GARNSKIRK RAILWAY.
"GEORGE STEPHENSON."
1831.



Diameter of cylinders	11 inches.
Length of stroke	16 inches.
Diameter of four coupled wheels... ...	4 feet 6 inches.
Wheel base	4 feet 9 inches.
Length of boiler	6 feet 11 inches.
Diameter of boiler	3 feet.
Number of tubes	113.
Diameter of tubes	$1\frac{5}{8}$ inch.
Total heating surface	399 square feet.
Pressure of steam	50lbs. per sq. in.

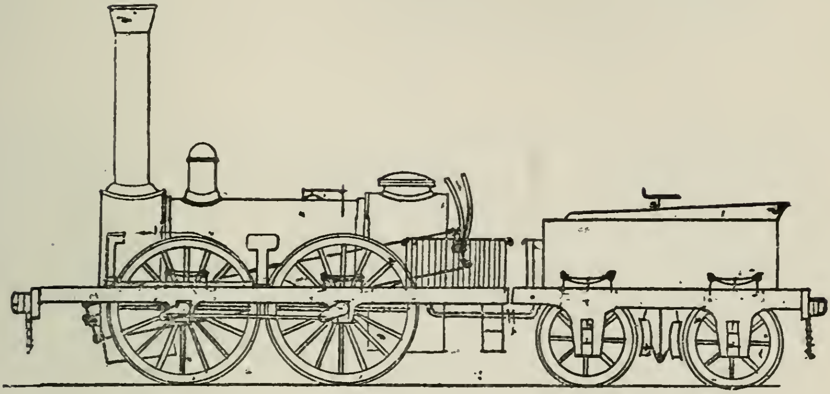
The annexed diagram illustrates an engine named the "Comet," built by R. Stephenson and Co., for the Leicester and Swannington Railway, 1832. It was finished at the Newcastle works on the 5th May, 1832, being No. 4 upon the maker's list, and No. 1 upon that of the railway company.

The "Comet" was shipped by sea from Newcastle to Hull, thence by canal to Leicester, and was put upon the rails at the old Fosse Road siding, Leicester. and after doing some preliminary ballasting, it worked the train upon the opening day from West Bridge to Bagworth (known as the "lower end" of the line), driven by George Stephenson himself assisted by his son Robert and the regular driver, Robert Weatherburn

LEICESTER AND SWANNINGTON RAILWAY.

COMET," No. 1.

May, 1832.



Diameter of cylinders	12 ins.
Length of stroke	16 ins.
Length of boiler	7 ft. 1½ ins.
Diameter of boiler	3 ft.
Pressure of steam	50lbs. per sq. in.
Number of tubes	97.
Diameter of tubes	1⅝ ins.
Length of firebox	2 ft.
Width of firebox	3 ft.
Area of grate	6 sq. ft.
Heating surface of tubes	302·9 sq. ft.
Heating surface of firebox	37·3 sq. ft.
Total	340·2 sq. ft.
From rails to top of frame	3 ft. 3 ins.
Diameter of four coupled wheels	5 ft.

	ft.	ins.
From front of frame to centre of leading wheel	5	2
From centre of leading to centre of driving	5	3
From centre of driving wheels to back of frame	5	9
Length of engine frame	16	2
Length of tender frame	10 ft.	

The cylinders were placed low down, the piston-rod passing *under* the leading axle.

There was a single eccentric only for each valve, loose upon the driving axle, motion being communicated by studs or drivers. The handles of the reversing gear upon the footplate were therefore constantly moving backwards and forwards during the time the engine was in motion.

The rod of the tender brake passed in a tube through the water tank, and the handle could only be reached by climbing upon the coke.

The chimney of the "Comet," when constructed, was 13 feet in height from the rail level; but as it was knocked down in the Glenfield Tunnel on the opening day, it was afterwards reduced to 12 feet 6 inches.

	tons.	cwts.	qrs.
Weight of engine in working order ...	9	9	2
Weight of tender fully loaded	3	10	0
Total	12	19	2

Shortly after the introduction of the "Samson" class upon the Liverpool and Manchester railway, it became apparent that these heavy goods engines, having a short wheel base of only 4 feet 9 inches, caused considerable oscillation and damage to the line. Stephenson therefore decided in 1831 that the "Atlas," No. 23, and "Milo," No. 25, which were required for "fast goods" traffic upon that line, should be generally of the "Samson" type, but with the addition of a small pair of wheels placed under the foot-plate, the result being that the engine became a six-wheeled locomotive, four coupled in front. The two engines were put into traffic in 1832, and proved very satisfactory.

Towards the close of the year 1831, and during the year 1832, several new engines were placed upon the Stockton and Darlington railway, numbered and named as follows:—

12 Majestic
13 Coronation
14 William IV.
15 Northumbrian
16 Director
17 Lord Brougham
18 Shildon
19 Darlington
20 Adelaide
21 Earl Grey
22 Lord Durham
23 Wilberforce

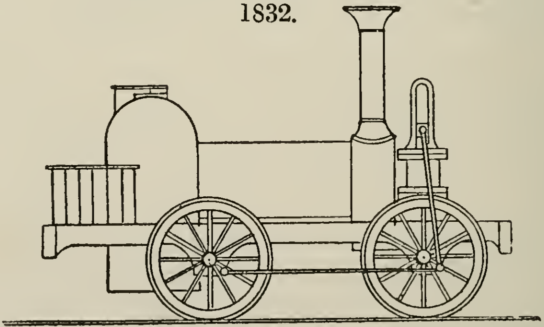
These engines were similar in design to Hackworth's engine, "Royal George." They had the return-flue in the boilers, vertical cylinders, and a tender at each end.

Messrs. Galloway, Borman, and Glasgow in 1832 constructed an engine for the

LIVERPOOL AND MANCHESTER RAILWAY.

"CALEDONIAN," No. 28.

1832.



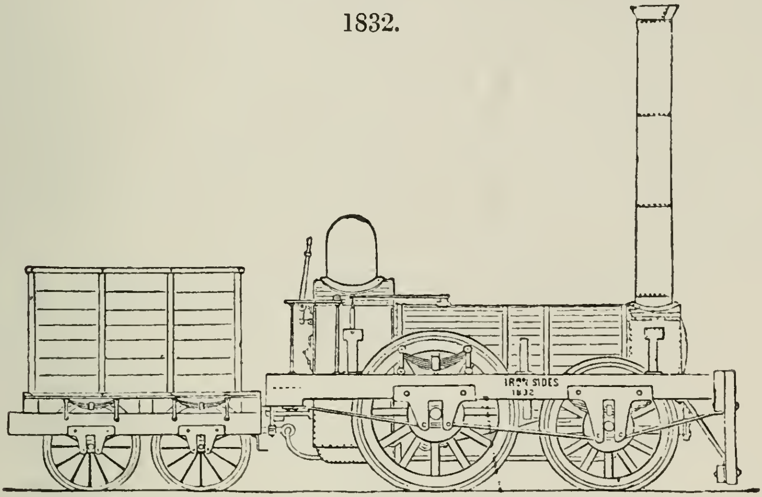
This engine ran upon four wheels of 5 feet diameter, coupled; the makers disapproved of the crank-axle as employed by Stephenson in his "Planet" class, and therefore resolved to place the cylinders vertically in front of the smoke-box, as shown in the diagram.

The engine was not successful, and after having run off the line upon some occasions was rebuilt with inside cylinders and a crank-axle.

We have recently been furnished from America with the annexed diagram of an old locomotive engine named "Ironsides," built for the Philadelphia, Germantown, and Norristown Railroad Company.

AN OLD AMERICAN LOCOMOTIVE.

1832.



It was the first railroad locomotive constructed by Mr. Baldwin, of the now famous "Baldwin Locomotive Works," Philadelphia, and was completed and ran a trial trip on the 23rd of November, 1832.

It will be seen that the "Ironsides" was a four-wheeled engine modelled essentially on the English practice of that time, and was very similar to the "Planet" and "Mercury" class introduced upon the Liverpool and Manchester railway by George Stephenson, in 1830.

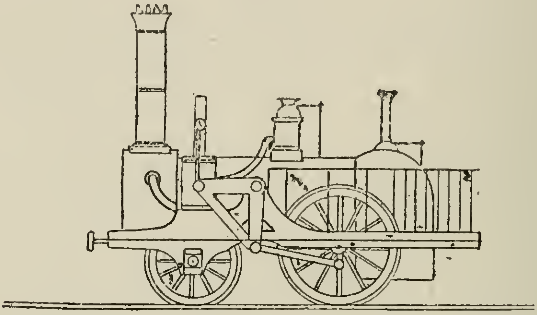
Diameter of driving wheels	4 ft. 6 ins.
Diameter of cylinders	9½ ,,
Length of stroke	18 ,,
Diameter of boiler	2 ft. 6 ,,
Length of boiler between tube-plates	7 ,,
Number of Tubes (copper)	72
Diameter of tubes	1½ ,,

The valve-gear of the "Ironsides," when constructed in 1832, consisted of a single loose eccentric for each cylinder, placed upon the axle between the crank and the boss of the wheel. On the inside of the eccentric was a half-circular slot running halfway round. A stop was fastened to the axle at the arm of the crank, terminating in a pin which projected into the slot. The engine was reversed by changing the position of the eccentric on the axle by a lever operated from the foot-plate, which lever it should be mentioned was constantly moving forwards and backwards during the time the engine was in motion. This form of valve-gear was, however, shortly afterwards changed, and the "Ironsides" was provided with a single fixed eccentric for each cylinder; the rocking-shafts, which were under the foot-plate, had arms above and below, and the eccentric-straps had each a forked rod with a hook, or an upper and lower latch or pin, at their extremities, to engage with the upper or lower arm of the rocking shaft; the eccentric rods were raised or lowered by a double treadle, so as to connect with the upper or lower arm of the rocking shaft, according as a forward or backward motion was desired. Weight of engine in working order, five tons. The tender ran upon four wheels, and contained an iron tank for water inclosed in a wooden casing, and with a coal space in front.

Messrs. R. Stephenson & Co., in 1833, constructed an engine for the Saratoga and Schenectady Railway of America. It had a leading bogie, and a single pair of driving wheels placed behind the fire-box; the "bogie" was found to work very satisfactorily upon sharp curves, and has always been in use upon American passenger engines.

Mr. Roberts, of the firm of Sharp, Roberts and Co., now Sharp, Stewart and Co., in the year 1833 designed and constructed an engine for the Liverpool and Manchester Railway, named

LIVERPOOL AND MANCHESTER RAILWAY.
"EXPERIMENT," No. 32.
1833.



It will be seen that the cylinders were placed vertically over the leading wheels, the motion of the cross-heads being communicated to the crank-pins upon the driving-wheels by means of connecting-rods and bell cranks. The leading-wheels had outside, and the driving-wheels inside, bearings. Diameter of cylinder, 11 inches; length of stroke, 16 inches; driving-wheels, 5 feet diameter.

This engine had no eccentrics to actuate the valves, a short lever on the bell crank giving the throw by a long rod to rocking gear on the foot-plate. The valves were tubular, without lap or lead. The pistons had not the usual elastic packing rings, but were made nearly frictionless by exactly fitting the vertical cylinders, and having a white metal surface.

In 1834, Messrs. Sharp, Roberts and Co. supplied three engines exactly similar to the "Experiment" for the opening of the Dublin and Kingston Railway, named Hibernia, Manchester, and Britannia.

None of the engines were found satisfactory, and the firm very soon abandoned the design, and adopted the six-wheeled inside-cylinder pattern, similar to Stephenson's "Patentee" class; but with the characteristic features which always distinguished Messrs. Sharp, Roberts' engines.

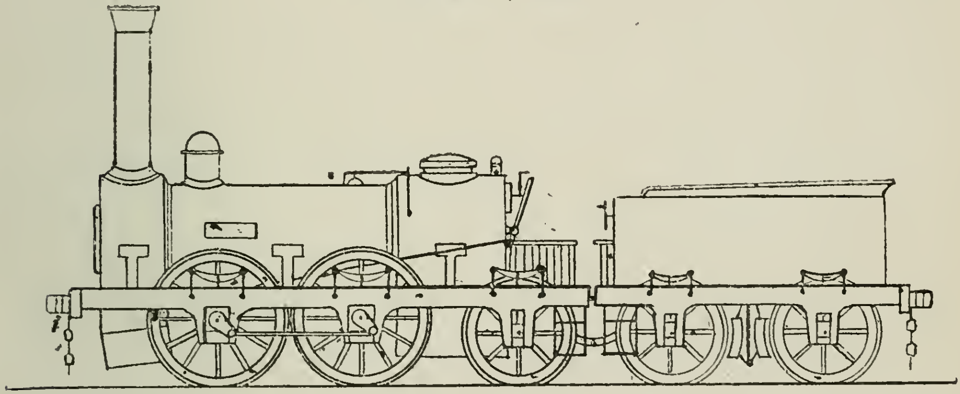
During the year 1833 an engine having bell-cranks was built at Dundee for the Dundee and Newtyle Railway, and it continued at work on that line for many years.

We have already illustrated the "Comet," which opened the Leicester and Swannington Railway.

R. Stephenson and Co. afterwards constructed three other engines for that line of a similar design, but having the four wheels of 4 feet 6 inches diameter; they where named "Phœnix," built 1832; "Samson" and "Goliath," 1833. Bury and Co. also built "Liverpool," No. 5, 1833.

When examining the old books of the Company we found records showing that in practice the four-wheeled engines having a short wheel-base and over-hanging frame, caused considerable oscillation, and consequently damage to the permanent way; it was therefore decided by the Directors (acting upon the advice of one of their number, Mr. George Stephenson), to have the next engine for the Leicester and Swannington line constructed to run upon six wheels (a similar design of engine named "Atlas" and "Milo" have given satisfaction upon the Liverpool and Manchester Railway).

LEICESTER AND SWANNINGTON RAILWAY.
"HERCULES," No. 6.
DECEMBER, 1833.



This engine was completed by Messrs. Stephenson and Co. upon the 17th December, 1833, being No. 36 in the books of the makers, named "Hercules," and No. 6 in the books of the Leicester and Swannington Company.

Diameter of cylinders...	14 inches.
Length of stroke	18 ,,
Diameter of coupled wheels	4 ft. 6 ins.
Diameter of trailing wheels	3 ft. 6 ins.
Length of boiler	8 ft. 0½ in.
Diameter of boiler	3 ft. 6 ins.
Number of Tubes	125
Diameter of tubes	1⅝ in.
Heating surface of firebox	53·63 sq. ft.
Heating surface of tubes	460·62 ,,
Total	514·25 ,,

Working pressure of steam 55 lbs. per square inch, which was afterwards increased to 60 lbs.

The overhanging frame of the "Comet" and other four-wheeled engines, it will be observed, was entirely avoided in the construction of the "Hercules," as shown by the following figures :—

From front of frame to leading wheels	5 ft. 2 ins.
From leading to driving wheels	4 ,, 9 ,,
From driving to trailing wheels	5 ,, 2 ,,
From centre of trailing to back of frame	2 ,, 0½ ,,
Total length of frame	17 ft. 1½ ins.
Length of wheel base	9 ft. 11 ins.

The cylinders were placed low down, the piston-rods passing under the leading axle.

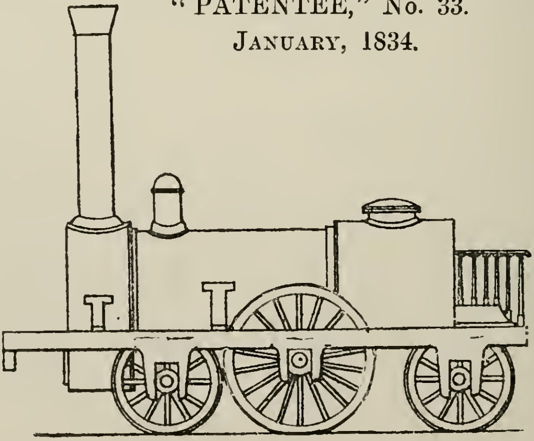
Distance from rails to top of frame	3 ft. 3 ins.
,, ,, ,, ,, chimney	12 ,, 6 ,,
Weight of engine in working order	11 tons 0 cwt.
Weight of tender fully loaded	4 ,, 6 ,,
Total	15 tons 6 cwt.

The "Hercules" when built was considered the largest and most powerful development of goods engine at that time; its working was therefore watched with considerable interest, as shown by the reports which had to be sent weekly to the directors and to the makers for several months, and the copies we have seen in the railway company's books show that the "Hercules" was "highly satisfactory."

When built the engine had a flange upon the driving wheels; this was, however, removed after it had been at work about three months.

Experience proved that the engines of the "Atlas" and "Milo" type were very satisfactory, Stephenson therefore determined to construct the "Patentee," No. 33, upon the model of the "Mercury," but with an additional small pair of trailing wheels under the foot plate. This engine was named "Patentee" because it was the "first" constructed by Stephenson under his patent of 1833, which provided that six-wheeled engines should have no flanges upon the middle pair of wheels, in order that they could easily pass round curves.

LIVERPOOL AND MANCHESTER RAILWAY.
"PATENTEE," No. 33.
JANUARY, 1834.



Diameter of cylinders	12 inches.
Length of stroke	18 inches.
Diameter of driving wheels	5 feet.

Heating surface of tubes	350·1 square feet.
Heating surface of firebox	46·49 square feet.
Total	396·59 square feet.

	tons.	cwts.
Weight of engine in working order	14	8
Weight of tender fully loaded	5	0
Total	19	8

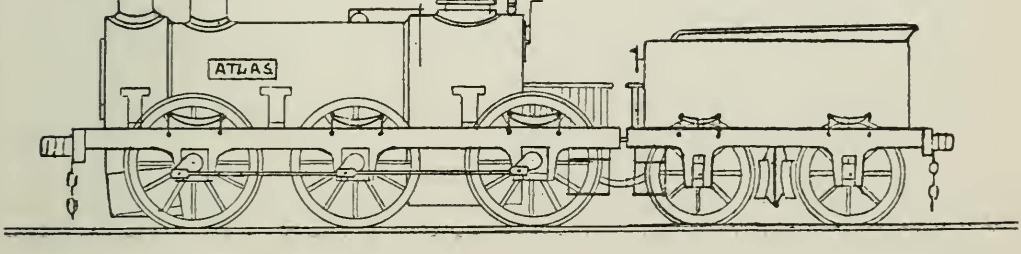
Our previous illustrations have clearly shown the gradual development of the four-wheeled engines into the six-wheeled type.

During the year 1833, the portion of the Leicester and Swannington Railway know as the "Upper End" was opened by the "Samson," No. 3, driven on the occasion by Mr. Robert Stephenson, assisted by R. Weatherburn, driver. The large increase in the coal traffic soon necessitated the use of more powerful engines to convey the trains upon the rising gradients of 1 in 251, and 1 in 203 between the top of the Swannington incline and the top of the Bagworth incline. To overcome the difficulty, Mr. Stephenson decided, in September, 1833, to construct a further development of the "Hercules" type by substituting another pair of coupled wheels in place of small trailing wheels. The new engine was completed at Newcastle upon February 8th, 1834, being No. 58 in the books of the makers, and the fourth engine constructed under their patent of 1833. It was named "Atlas," and No. 8 in the books of the Leicester and Swannington Railway.

LEICESTER AND SWANNINGTON RAILWAY.

"ATLAS," No. 8.

February, 1834.



Diameter of cylinders	16 ins.
Length of stroke	20 ,,
Diameter of six-coupled wheels	4 ft. 6 ins.
Length of boiler barrel	8 ,, 6 ,,
Diameter of boiler	3 ,, 11 ,,
Number of tubes	154
Diameter of tubes	1⅝
Heating surface of firebox...	67·45 sq. ft.
,, ,, tubes	589·05 ,,
Total ...	656·50 ,,

Working pressure of steam, 60 lbs. per square inch, afterwards increased to 70 lbs.

	ft.	in.
From front of frame to leading wheels...	4	5
,, leading to driving wheels	5	6
,, driving to trailing wheels	6	1½
,, centre of trailing to back of frame	2	10
Total length of frame ...	18	10½
Length of wheel base	11	7½

The cylinders were placed low down, the piston-rods passing under the leading axle.

Distance from rails to top of frame	3	4
,, ,, chimney	12	6

Weight of engine in working order	15 tons
Weight of tender fully loaded	5 ,,
Total ...	20 tons

The driving-wheels were without flanges.

It will be seen from the illustration that the "Atlas" having inside cylinders and six-coupled wheels, was the type of goods engine which has since been very largely employed in this country. The valve gear consisted of a single eccentric for each cylinder, and the engine was reversed by means of "treadles" on the foot-plate. The "Atlas" was stationed at the Long Lane, now Coalville, and worked satisfactorily for fully 25 years, becoming the property of the Midland Railway Company when the Swannington line was purchased; this engine was afterwards let on hire to colliery owners, and was ultimately sold to a contractor, being finally broken up after working for more than 40 years.

We here direct the special attention of our readers to the two previous illustrations, from which it will be seen that in 1833-4 Stephenson had produced two engines, the "Patentee" and the "Atlas," which became standard patterns, and have been copied in this country and all parts of the world. The modern passenger engines are a development of the "Patentee" class, and the goods engines are a development of the "Atlas" class.

In 1834, Forrester and Co., of Liverpool, constructed an engine for the Liverpool and Manchester Railway named "Swiftsure," No. 36; this firm adopted the general style of Stephenson's "Patentee," but placed the cylinders *outside*, the connecting rods acting upon cranks fixed upon the driving axle outside the outside axle-boxes, the cylinders being thus placed at an extreme distance from the centre line of the engine, very considerable oscillation resulted when running at high speed.

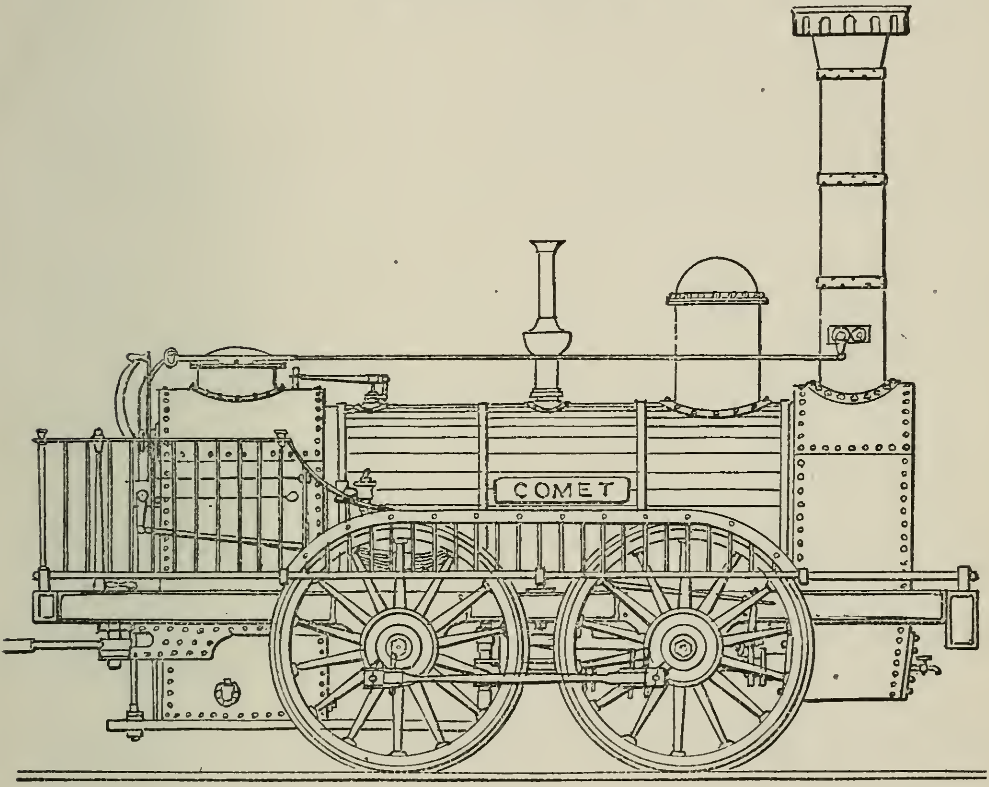
Messrs. Tayleur and Co., of the Vulcan Foundry, Warrington, constructed a six-wheeled coupled engine for the Leicester and Swannington Railway in 1835, named "Vulcan," No. 9; it was very similar to the "Atlas." It had cylinders 16 × 20, and wheels 4 feet 6 inches diameter, and was stationed at Coalville.

Messrs. R. and W. Hawthorn, of Newcastle, designed and constructed, in 1835, an engine for the

NEWCASTLE AND CARLISLE RAILWAY.

"COMET."

March, 1835.



The "Comet" conveyed one of the trains of passengers on the opening of the Newcastle and Carlisle Railway, 9th March, 1835. It had four coupled wheels 4 feet diameter, the cylinders were 12 inches diameter, and the stroke 16 inches. It will be seen that they were placed low down under the smoke-box, the piston-rod working under the leading axle.

Note.—The above illustration is drawn to a scale of $\frac{1}{4}$ inch = 1 foot, and those which follow are also upon large scales.

Heating surface of fire-box	... ...	35 square feet
,, ,, tubes	... ...	237 ,, ,,
Total	...	272

Pressure of steam 60 lbs. per square inch. The tender ran upon four wheels, and carried 680 gallons of water.

The "Comet" and several other engines of a similar design worked with great efficiency for many years upon the Newcastle and Carlisle Railway.

The opening of the first portion of the Broad Gauge Great Western Railway in 1837, and the "Battle of the Gauges" which followed for about fifteen years, created a rivalry which assisted materially in the development of the locomotive.

Messrs. Brunel and Gooch placed engines on that line having driving wheels 8 feet diameter, and in 1837-8 Mr. Brunel designed, and Messrs. Hawthorn constructed, the "Hurricane," having a pair of 10 feet wheels, these being the largest wheels ever made.

The well-known "Link-motion" valve gear was invented by William Howe in 1843, and became generally adopted for Locomotives.

Brunel and Gooch, in 1846, produced the "Great Britain" type, having 8 feet wheels, and cylinders 18 × 24, which was the ultimatum for the Broad Gauge, and they considered that no narrow gauge engine could be made with such a large wheel or of similar power.

F. Trevithick, son of the great Trevithick, in 1847 constructed the "Cornwall" at Crewe, for the London and North Western Railway, having a driving wheel of 8 feet 6 inches, and that engine is still at work on the North Western, No. 173.

In 1848, Messrs Bury and Co. built an engine for the London and North Western Railway, from the designs of Mr. Crampton. It was named the "Liverpool," and had cylinders 18 × 24, and 8 feet wheels. This engine was the ultimatum for the narrow gauge.

In 1853, the Bristol and Exeter Railway had some broad gauge tank engines with wheels of 9 feet diameter they ran 80 miles an hour.

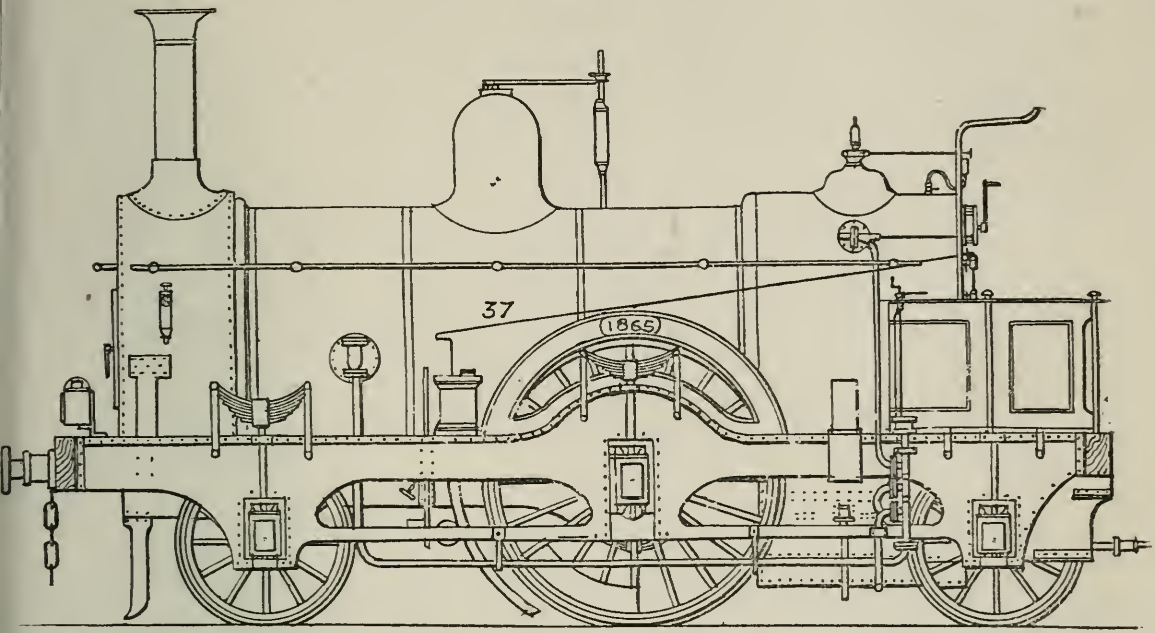
The Caledonian Railway Company, in 1861, had some engines built by Neilson and Co., with wheels 8 feet 2 inches diameter. And since 1871 the Great Northern Company has employed wheels of 8 feet 1 inch for its fastest traffic, and the fact that the Great Northern engines have wheels 8 feet 1 inch, and cylinders 18½ × 28, proves that the Battle of the Gauges has ended greatly in favour of the narrow gauge locomotive.

During the early part of the year 1852, the late Mr. M. Kirtley designed for the Midland Railway what was then considered on that line a very large class of express engine, having driving wheels 6 feet 6 inches diameter, and cylinders 16 × 22 inches. Six engines were at once constructed by Messrs. R. Stephenson and Co., their numbers being from 130 to 135 inclusive, and it may be mentioned that they had no flanges upon the driving wheels; No. 130 is still at work under its present number 4, and 133 is also running between Derby and Leicester, &c.

Messrs. Sharp, Stewart, and Co., during the year 1853, built the 120 to 129 class from Mr. Kirtley's design, but a brass dome was placed close to the chimney.

MIDLAND EXPRESS ENGINE.

1865.



In 1864, Mr. Kirtley decided to construct, at the Company's Derby works, twenty engines of a similar type but of greater size and power. They were numbered from 25 to 39, 94, and from 97 to 100 inclusive.

We illustrate No. 37, the engraving being taken from a drawing made by the writer at the locomotive sheds, Leicester, August, 1865, when the engine was quite new.

It will be seen that the engine ran upon six wheels, and had double frames, the driving axle having both inside and outside bearings.

Diameter of driving wheels, 6 feet 8 inches; distance between cylinders, 2 feet 6 inches; diameter of cylinders, $16\frac{1}{2}$ inches; length of stroke, 22 inches.

The tractive force which could be exerted for each pound of effective pressure per square inch in the cylinders being thus—

$$\frac{16\frac{1}{2}\times 16\frac{1}{2}\times 22}{80}=74\cdot 87\text{ lbs.}$$

The boiler contained 169 brass tubes of 2 inches diameter outside. Working pressure of steam, 140 lbs.

The tender runs on six wheels and carries 1,800 gallons of water and 2 tons of coal.

These engines have been remarkable for the heavy work which they have performed, and the economy both in fuel and repairs.

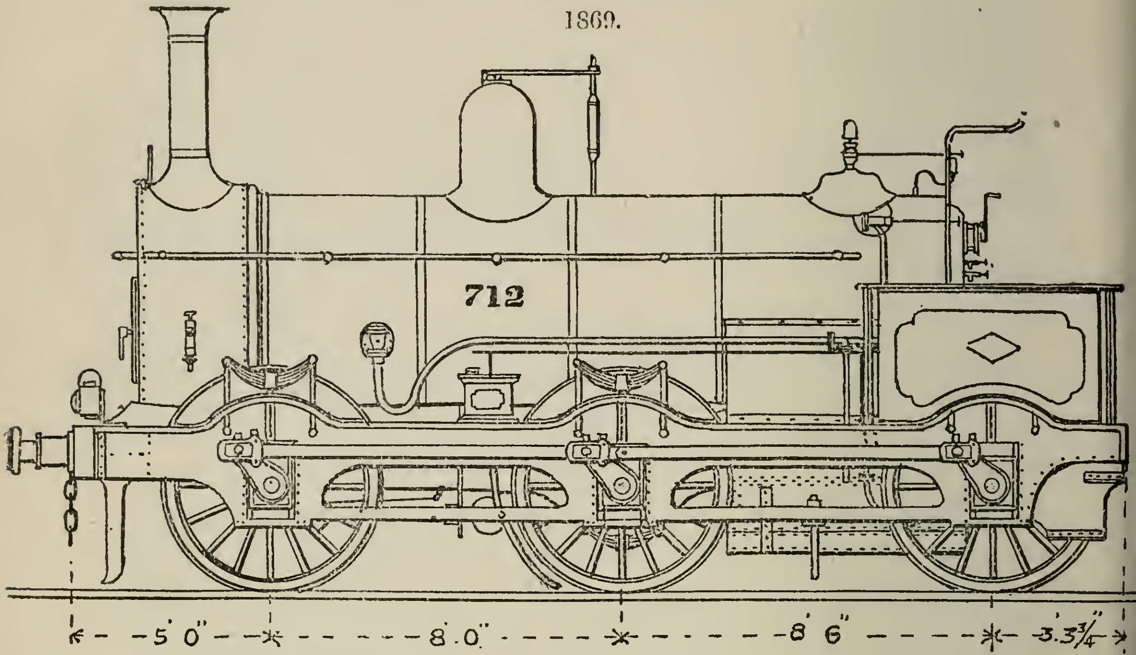
With a load suitable to their power, they are still capable of running at the highest speeds required, and it is worthy of note that the new class of Midland "single" engines, one of which has been sent to the Paris Exhibition, retains the double framing, also the inside and outside bearings for the crank-axle—in the new engines, however, a bogie takes the place of the leading wheels, and the dimensions generally are much increased.

The annexed diagram, engraved from a drawing made by the writer at the locomotive sheds, Leicester, twenty years ago, illustrates one of the late Mr. Matthew Kirtley's standard pattern of goods engines for the Midland Railway.

No. 712 was constructed by Messrs. Dübs and Co., Glasgow, and commended to work early in the year 1869.

MIDLAND GOODS ENGINE.

1869.



It will be seen from the illustration that the engine has inside cylinders, double frames, and six wheels coupled, the principal dimensions being as follows :—

Diameter of cylinders	17 inches.
Length of stroke	24 ,,
Diameter of wheels	5 ft. 2 in.

The tractive force exerted for each pound of effective pressure on the pistons being 111·87 lbs., or thus—

$$\frac{17 \times 17 \times 24}{62} = 111{\cdot}87 \text{ lbs.}$$

Distance between centres of cylinders	2 ft. 6 in.
Diameter of boiler inside	4 ft. 2 in.
Diameter of tubes outside	2 inches.
Number of tubes	168
Heating surface of tubes	993 sq. feet.
Heating surface of fire-box	103 ,,
Total ...	1,096

Area of firegrate	17 sq. feet.
Pressure of steam	140 lbs. per sq. in.

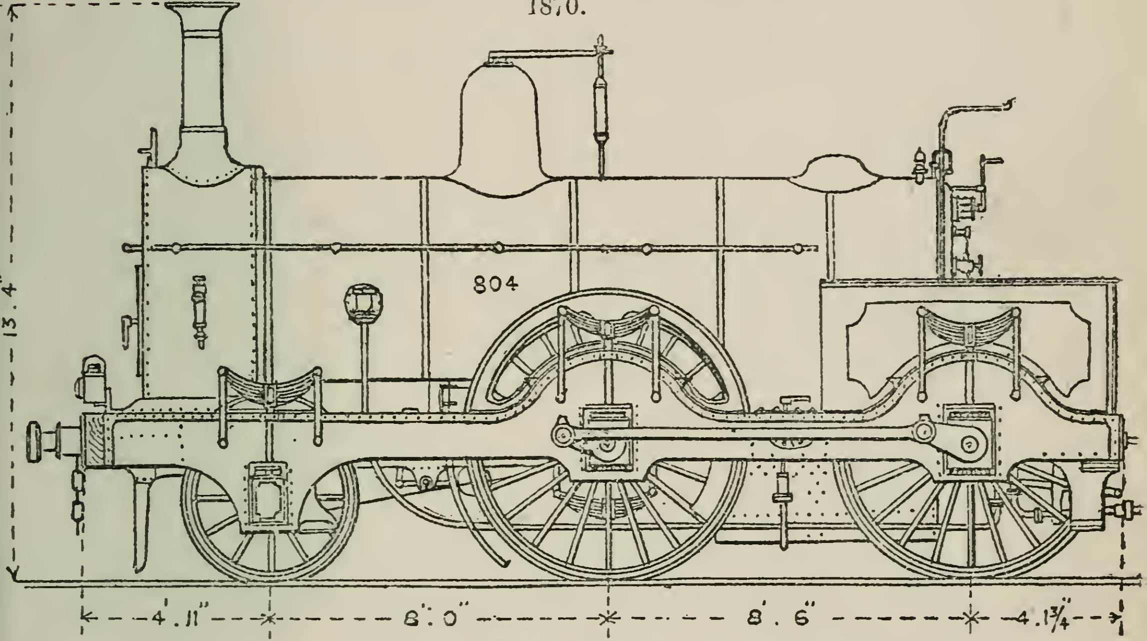
Weight of engine in working order—	Tons	cwts.	qrs.
On leading wheels	12	8	0
On driving wheels	12	13	0
On trailing wheels	9	12	0

Weight of engine	34	13	0
Weight of tender...	24	15	2
Total ...	59	8	2

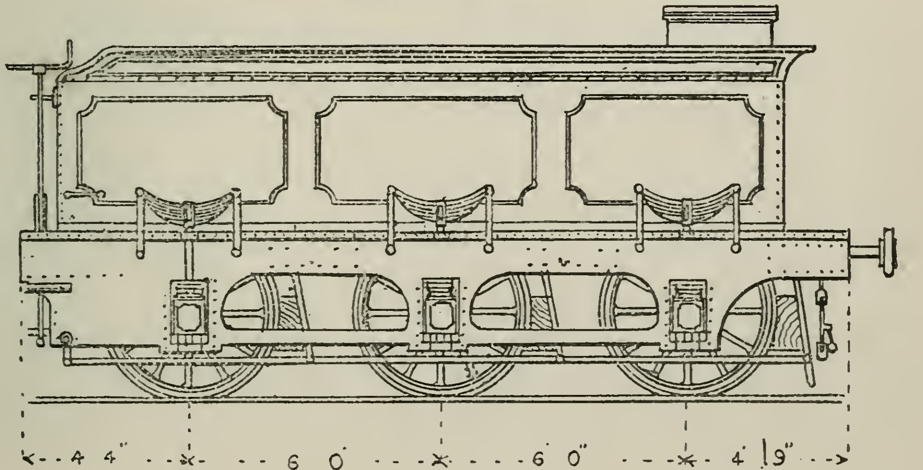
The heating surface above given is the amount as calculated from from the writer's measurements; the weights were furnished to us by Mr. Kirtley. The tender runs upon six wheels, and is in every respect similar in design, construction, and weight to that of No. 804, which we illustrate below.

It should be mentioned that 712, and the large number of engines of similar design, have done, and are still doing, excellent work on the Midland Railway. Other engines of this design were constructed by various makers, and are numbered from 696 to 779, from 830 to 879, from 910 to 1,069; also 224, 228, 229, 243, 244, 252, 266, 271, 272, 279, 303, 320, 350 to 355, 357, 358, 488.

MIDLAND EXPRESS ENGINE. 804.
1870.



TENDER. 804.



Mr. M. Kirtley designed a powerful class of express engine for the Midland Railway, well known as the 800 class, and noted for the excellent and heavy work performed. 804 is one of thirty constructed by Neilson and Co., Glasgow, 1870. (See page 29).

The engine had cylinders 17 inches diameter, and a stroke of 24 inches, the coupled wheels being 6 feet 8 inches (80 inches) diameter; the tractive force which could be exerted for each pound of average effective steam pressure per square inch upon the pistons being 86·7 lbs., or thus—

$$\frac{17 \times 17 \times 24}{80} = 86{\cdot}7 \text{ lbs.}$$

The distance between the centres of the two cylinders is 2 feet 6 inches; this has always been a very great advantage to these engines, on account of the extra width available for steam and exhaust passages.

The boiler and fire-box was of the standard pattern, previously used by Mr. Kirtley for his goods engines, and contained 168 brass tubes of 2 inches diameter outside, and was fed by one injector and one pump.

Heating surface of tubes	993	square feet.
,, ,, fire-box	103	,,
Total ...	1,096	,,

Two safety valves were placed upon the dome, pressed to blow off at 140 lbs. per square inch.

A Roscoe lubricator was also provided.

Surface or area of fire-grate, 17 square feet; wheel-base of engine, 16 feet 6 inches.

Weight in working order—

	tons.	cwts.	qrs.
Of engine	35	18	2
Of tender	24	15	2
Total ...	60	14	0

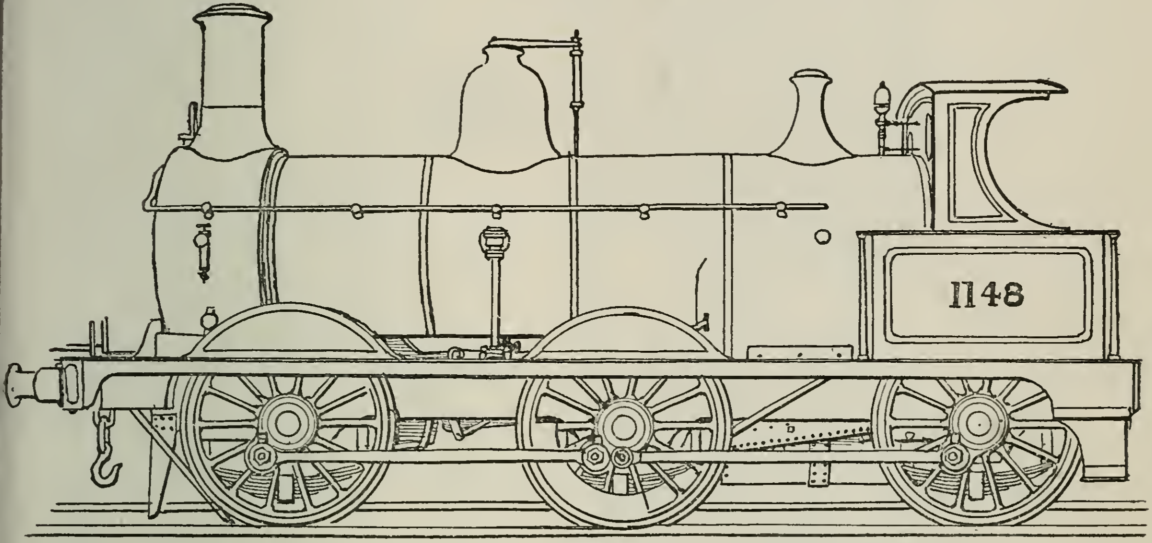
Thirty engines were constructed by Messrs. Neilson, and numbered from 800 to 829 inclusive; they have the ordinary link motion, but various forms of reversing screws fixed upon the foot-plate, and were all fitted with the "Le Chatelier" system of reversing and turning water into the exhaust passages. During the time the engines were being designed and constructed, it was suggested that a hand-brake upon the engine wheels would be of great advantage; opinion, however, was at that date so strong against engine brakes, that the "Le Chatelier" system was preferred, but practice showed that it strained several of the driving-axles, and its inefficiency as a train-stopper was most clearly shown in the Kildwick accident.

The tender ran upon six wheels, and carried 2,000 gallons of water, and, if necessary, 4 tons of coal, and was provided with a hand-brake applying a wooden block to each wheel. In addition to the thirty engines constructed by Neilson, eighteen others of similar design were at the same time built at the Company's works, Derby, their numbers being 3, 22, 23, 60, 61, 62, 63, 64, 65, 66, 93, 138, 139, 165, 166, 167, 168, 169. These engines were "reversed" by means of the usual lever, and had not the Chatelier arrangement.

The whole of the 48 engines of the 800 class have been re-built by S. W. Johnson, and have 18-inch cylinders, and ten of them have had the stroke also lengthened to 26 inches, and for several years they have been provided with brake-blocks upon the coupled wheels.

MIDLAND MINERAL ENGINE.

1875.



Mr. S. W. Johnson, in 1875, introduced a powerful type of engine upon the Midland railway for the conveyance of heavy mineral trains, No. 1,148 being one of those built by Kitson and Co., of Leeds, 1875. Engines of this class have cylinders $17\frac{1}{2} \times 26$, and six coupled wheels of 4 feet 10 inches diameter; the tractive force for each pound of effective pressure on the pistons being therefore—

$$\frac{17\frac{1}{2} \times 17\frac{1}{2} \times 26}{58} = 137 \cdot 284.$$

Heating surface ... ... 1,225 square feet.

The engine illustrated has done very good work on the Midland Railway, and the following numbers are of the same dimensions :—

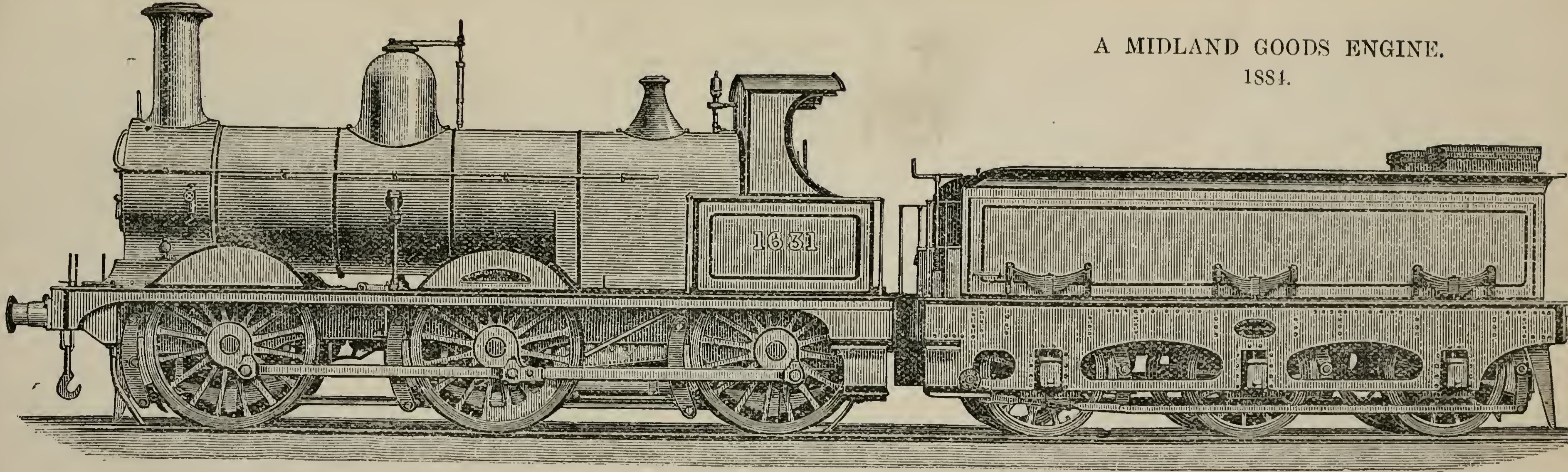
381 to 385
400 to 404
1142 to 1251

It will be observed that there is no brake upon the engine wheels. Some of these engines have, however, since been fitted with brakes, and it is intended to fit them to all.

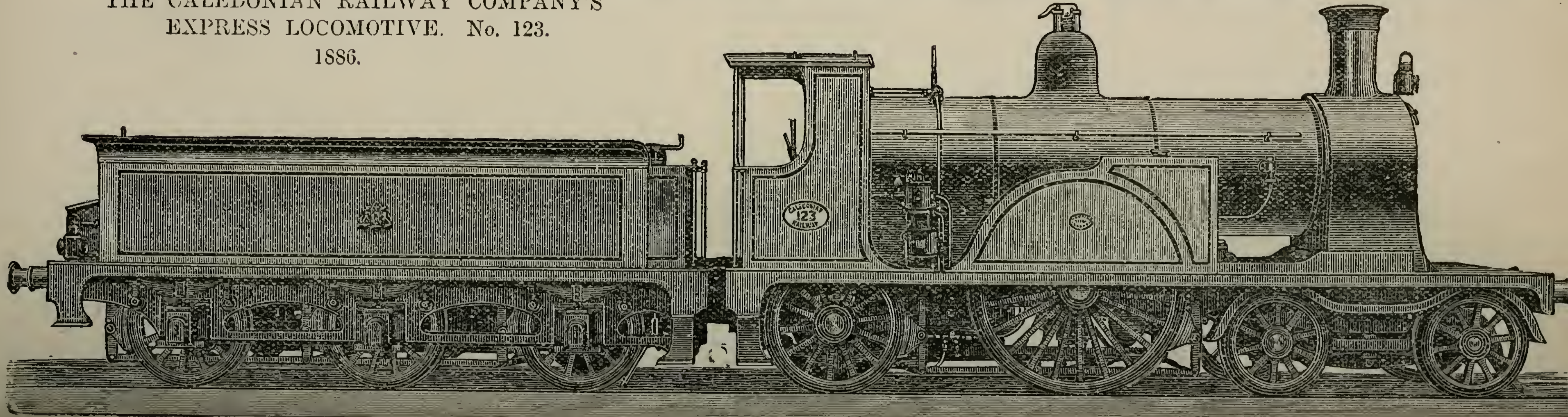
A still more powerful engine of the same type was introduced by Mr. Johnson in 1885, having cylinders 18 × 26, and wheels 4 feet 9 inches, their numbers being—

1698 to 1717
1758 to 1797

A MIDLAND GOODS ENGINE.
1884.



THE CALEDONIAN RAILWAY COMPANY'S
EXPRESS LOCOMOTIVE. No. 123.
1886.



A MIDLAND GOODS ENGINE.

(*See opposite page.*)

The heavy express goods traffic upon the Midland Railway necessitates the employment of powerful locomotives. We here illustrate No. 1631, being one of the class possessed by the Company and constructed from the designs of Mr. S. W. Johnson, locomotive superintendent.

No. 1631 was built by Messrs. Beyer, Peacock, and Co., at the Gorton Foundry, Manchester, in 1884, being one of an order of 50 built by that firm and No. 6210 upon their books; the chief dimensions being as follows :—

Cylinders (inside)	17½ in. diameter.
Length of stroke	26 in.
Diameter of six coupled wheels	5 ft. 2½ in.
Length of boiler barrel	10 ft. 6 in.
Diameter of boiler...	4 ft. 1 in.
No. of tubes, 205.	
Diameter of tubes (outside)	1¾ in.
Copper firebox—	
Length of firebox	5 ft. 2⅞ in.
Width of firebox	3 ft. 4½ in.
Height of firebox at front	5 ft. 11½ in.
,, ,, at back	5 ft. 4½ in.

Pressure of steam in boiler 140 lbs. per sq. in.

Heating surface of tubes	1023·19 sq. ft.
,, ,, firebox	91·81 ,,
Total	1,122·0 ,,

Area of firegrate, 17¾ sq. ft.

The tractive force exerted for each pound of effective pressure per square inch in the cylinders is 127·4 lbs., or thus :—

$$\frac{17\cdot5\times17\cdot5\times26}{62\cdot5}=127\cdot4$$

The valve gear is the ordinary link motion.

The tender runs upon six wheels.

Diameter of wheels	4 ft. 0½ in.
Contents of water tank	2,200 gallons
Coal space	144 cubic ft.

	Tons	cwt.	qrs.
Weight of engine, empty	34	4	0
,, tender, ,, ...	17	1	0
Total, empty	51	5	0

	Tons	cwts.	qrs.
Weight of engine in working order	37	2	2
,, tender, loaded	30	8	1
Total, loaded	67	10	3

The engine and tender wheels are all fitted with a steam brake, and the tender brake can also be applied by hand. No. 1631 and many other engines of the class being required to work passenger trains and heavy excursion traffic are also provided with the necessary apparatus for working the continuous vacuum brake.

We have already mentioned that the Midland Company has several engines similar to our illustration. Their numbers are as follows :—

20 engines, Nos. 1357 to 1376, built by Dubs & Co.; 30 engines, Nos. 1432 to 1451, and Nos. 1462 to 1471, built by R. Stephenson & Co.; 10 engines, Nos. 1452 to 1461, built by the Company at Derby; 50 engines, Nos. 1582 to 1631, built by Beyer, Peacock, & Co.

Ten other engines have been built by the Company, having the same sized wheels and length of stroke, but with 18-inch cylinders; they are numbered 1798 to 1807.

The whole of the above engines are giving great satisfaction, and the Company is about to add 50 more to its stock.

THE CALEDONIAN RAILWAY COMPANY'S EXPRESS LOCOMOTIVE

No. 123.

(*See page* 32.)

The Caledonian Company's express engine, No. 123, was designed by Mr. Drummond, locomotive superintendent, and constructed by the well-known firm of Neilson and Co., Hyde Park Works, Glasgow, in 1886, and was sent to the Edinburgh Exhibition in that year.

For heavy trains on steep gradients it is absolutely necessary to employ coupled engines; but for easy riding, fast running, and economy, nothing can equal a "single" engine, and it will be observed that Mr. Drummond, in this engine, employs the single pair of driving-wheels, and obtains the necessary adhesion by means of a sand-blast worked by compressed air from the Westinghouse brake apparatus.

The following are the principal dimensions of the Engine :—

Diameter of driving wheels	7 feet.
Diameter of cylinders	18 inches.
Length of stroke	26 inches.

The tractive force exerted for each pound of effective pressure per square inch in the cylinders being thus :—

$$\frac{18 \times 18 \times 26}{84} = 100{\cdot}285 \text{ lbs.}$$

Length of boiler between tube plates	10 ft. 7 ins.	
Diameter of boiler (inside)	4 ft. 3 ins.	
Number of tubes	196	
Diameter of tubes	$1\frac{3}{4}$ ins.	
Working pressure of steam	150 lbs.	
Total heating surface	1,053 sq. ft.	
Weight of engine in working order—	Tons.	cwts.
On bogie wheels	13	10
On driving wheels	17	0
On trailing wheels	11	8
Total	41	18
Weight of tender, loaded	33	9
Grand total	75	7

The engine is provided with Adams' Vortex blast-pipe, the Westinghouse automatic brake, a sand-blast, two injectors, and two water gauges. The tender runs on six wheels, and carries 2,850 gallons of water, and has a coal space of 210 cubic feet. The tender brake can be applied by either Westinghouse apparatus or by the usual hand-screw. Wheel-base of engine and tender 42 ft. 6 ins.

No. 123 took a very important part in the Railway Race in August, 1888, being employed to work the West Coast trains between Carlisle and Edinburgh.

The writer rode several trips over this distance behind No. 123, and on one day timed the distance of $100\frac{1}{2}$ miles covered in 104 minutes, some of the rising gradients being:—

1 in 88 for 2 miles.
1 in 80 ,, 2 ,,
1 in 75 ,, 6 ,,

this is running up to the Beattock Summit.

Number 123 was put into express traffic between Edinburgh and Carlisle on the 1st June, 1888, and up to and including 18th May, 1889, it had run 63,071 miles.

"The averge number of vehicles was seven, six of which were 8-wheeled carriages, each 42 feet long, and one a 6-wheeled brake van, giving a total train weight of about 146 tons, exclusive of engine and tender.

"The average consumption of coal during the months of August, September, and October, 1888, was 31·8lbs. per engine mile."

MODERN LOCOMOTIVES.

Having considered in detail the gradual development of the locomotive, we will now refer briefly to some of the engines which are working important trains at the present time.

Upon the Great Northern Railway, the expresses are worked by Mr. Stirling's fine outside cylinder bogie engines, similar to No. 776, having a single pair of driving wheels, 8 ft. 1 in. diameter, cylinders some 18 and others $18\frac{1}{2} \times 28$. Another type, No. 238 for instance, has cylinders $18\frac{1}{2} \times 26$, and 7 ft. $7\frac{1}{2}$ ins. single wheels. No. 813 is a new coupled engine, just built, having cylinders $17\frac{1}{2} \times 26$, and wheels 6 ft. $7\frac{1}{2}$ in. diameter.

The Great Western Company still continues to work its broad gauge expresses, with the engines of the *Great Britain* type, designed by Brunel and Gooch, and built between 1846 and 1855; they still have single driving wheels 8 ft. diameter, and cylinders 18 × 24, but have been re-built. The Great Western Company has become the owner of the Bristol and Exeter Railway, and has reduced the wheels of the Bristol and Exeter engines from 9 ft. to 8 ft. The Great Western has also narrow gauge single engines, with 7 ft. wheels, and cylinders 18 × 24.

On the London and North-Western Railway a large number of the Webb compound engines are in use. They have three cylinders, and after the steam has done its work in the two high pressure cylinders it enters the one low pressure cylinder. The last new engine of this class, "Oceanic," No. 1302, has four driving wheels 7 ft. diameter, the small leading wheels have radial axle-boxes.

"The Lady of the Lake," which was in the Exhibition of 1862, and other engines of the class built by Mr. Ramsbottom, with outside cylinders and a single pair of driving wheels 7 ft. 7½ in. diameter, continue to run splendidly with a load suitable to their power. The Company also has a large number of four-wheeled coupled engines, having cylinders 17 × 24, and 6 ft. 7½ in. wheels.

The Midland Company has recently introduced some new engines, 30 class, having cylinders 18½ × 26, and a single pair of driving wheels 7 ft. 6 in. diameter, and a leading bogie, the steam pressure being 160 lbs.

The new coupled engines, 1738 class, have cylinders 18 × 26, 7 ft. wheels, and 160 lbs. of steam, and have a bogie at the leading end. For working its trains over the Lancashire and Yorkshire Railway, the Midland Company has recently built the 1808 class of bogie engines, having cylinders 18 × 26, and four coupled 6 ft. 6 in. wheels, and 160 lbs. of steam. The Company also has the 1667 class with 19 in. cylinders.

The North Eastern Company works the traffic between York and Edinburgh with locomotives having four coupled 7 ft. wheels, and cylinders 18 × 24, and Mr. T. W. Worsdell has recently placed a fine engine, No. 1329, on the line, having a leading bogie, a single pair of driving wheels 7 ft. 1¼ in. diameter and worked upon the compound principle.

The London and South Western Company employs bogie express engines, having a leading bogie, outside cylinders 18 × 24, and four coupled wheels of 7 ft. diameter.

On the Brighton Railway, Mr. Stroudley continues to construct his "Gladstone" class, having the four coupled 6 ft. 6 in. wheels placed in front, and a small trailing wheel. The cylinders are 18¼ and the stroke 26 in.; they have "air" reversing gear. These engines take very heavy trains and work remarkably well. This Company has also single express engines, with wheels 6 ft. 6 in., and the "Grosvenor," with wheels 6 ft. 9 in. diameter.

On the South Eastern Railway, express engines are employed designed by Mr. James Stirling, having a leading bogie and four coupled wheels of 7 ft. diameter, the cylinders being 19 × 26, they have steam reversing gear. Old "single" and "coupled" engines designed by Mr. Cudworth are also in use.

On the London, Chatham and Dover Railway, the express engines designed by Mr. W. Kirtley have a leading bogie and four coupled wheels of 6 ft. 6 ins. diameter, the cylinders being 17½ × 26.

The London, Tilbury and Southend Railway works its passenger traffic with large ten wheeled tank engines, having a leading bogie, four coupled wheels of 6 ft. diameter, and a trailing pair of small wheels, the cylinders are "outside" and 17 × 26, the total weight of these engines is 56 tons.

The North London Company works its heavy passenger traffic with outside cylinder, leading bogie tank engines, and it is worthy of note that this Company saw the advantage of high pressure, and worked with 160 lbs. per sq. inch steam pressure at a time when other railways used 120 and 140 lbs.

The Metropolitan and Metropolitan District Companies both work their heavy and continuous passenger traffic with leading bogie, outside cylinder, coupled passenger tank engines,—they have cylinders 17 × 24 and wheels 5 ft. 9 ins. diameter.

The Great Eastern Company has several useful classes of express engine, namely, the old "single" engines designed by Mr. Sinclair, and the large bogie express engines of the 602 class designed by Mr. Massey Bromley, having cylinders 18 × 26 and driving wheels 7 ft. 6 ins. diameter.

There is also the Coupled Compound Engine, No. 230, built by Mr. Worsdell, and the present coupled engines, constructed by Mr. Holden, having cylinders 18 × 24 and coupled wheels 7 ft. diameter.

The Manchester, Sheffield and Lincolnshire Company possesses some large single express engines, having 7 ft. 6 in. single driving wheels, the cylinders being 18 × 26, also coupled engines with wheels of 6 ft. 3 ins. diameter, and cylinders 17½ × 26, and a leading bogie.

The Lancashire and Yorkshire Railway having heavy gradients and frequent stoppages requires engines of considerable power, that company, therefore, employs engines having a leading bogie, four coupled wheels of 6 ft. diameter, and cylinders 17½ × 26.

The North British Railway is also one requiring power, we therefore find bogie express engines with four coupled wheels of 6 ft. 6 ins. diameter and cylinders 18 × 26.

On the Caledonian Railway several powerful engines are employed. Mr. Drummond has constructed bogie express engines with cylinders 18 × 26 and 6 ft. 6 ins. coupled wheels, and engine, No. 124, has 19 inch cylinders, then we find the "single" engine, No. 123, illustrated on page 32; and there are also the old "single" engines in use, having wheels 8 ft. 2 ins. diameter.

The Glasgow and South Western Company works its express traffic with engines having cylinders 18 × 26 and four coupled wheels of 7 ft. diameter, some of these have a leading bogie, others a pair of leading wheels, they are also fitted with steam reversing gear.

The Taff Vale Railway has recently added some powerful ten-wheeled passenger tank engines to its stock, these have been designed by Mr. Riches, and have a leading bogie, four coupled wheels, and a small pair of trailing wheels.

Upon the North Staffordshire Railway, coupled engines having cylinders 17 × 24 and 6 ft. wheels are found to give good results.

The Rhymney Company has some powerful coupled engines with wheels 4 ft. 7 ins. diameter and cylinders 17½ × 26.

The tank engines for working the passenger traffic between Liverpool and Birkenhead through the Mersey tunnel, are of exceptional power, the gradient to be ascended being no less than 1 in 27, the engines of the No. 1 class have six coupled wheels of 4 ft. 7 ins. diameter and a trailing bogie, the cylinders are 21 ins. diameter and and 26 ins. stroke, the total weight of this engine being 68 tons.

This great power and weight enables these engines to stop at any point within the tunnel, and start away with their trains upon the heavy gradient of 1 in 27.

From the foregoing notes it will be observed that considerable difference of design is to be found upon the various lines. It is well known both to locomotive superintendents and locomotive drivers that different gradients, speeds, circumstances and weights of trains require engines specially suitable, it is therefore impossible to suppose that any one class of engine can be successful on all lines, indeed it is well known that an engine which works splendidly under the conditions for which it was built, would prove inefficient upon another railway having different speeds and gradients.

There is every reason to believe that the various locomotive superintendents have designed and constructed engines which are specially suited to the special character of the work which the locomotives have to perform.

RAILWAY SPEED.

At various times very wild statements have been made with regard to the speeds at which engines have and can run, speeds of 100 miles an hour have been freely talked of by those who are unaware of the facts.

In 1853 one of the Bristol and Exeter 9 ft. engines was officially timed at a speed of just over 80 miles an hour, for a short distance upon a falling gradient with a light load.

Upon several occasions between 1847 and 1854 Brunel and Gooch tried their 8 feet Great Western engines, they attained speeds just over 78 miles an hour, but the engines could not reach a speed of 80 The Great Northern 8 ft. 1 in. engines have attained speeds 79½. miles an hour.

During the railway race of 1888 several trains on various lines ran on falling gradients at 76 miles an hour, and in ordinary traffic speeds on certain portion of railways are daily run of 70, 73, and occasionally 75 miles an hour. It therefore may be said that 80 miles an hour is the limit of a locomotive's pace, and the cause of this is that at a speed of 80 miles an hour the resistance of the air, the back pressure and the friction together, have become so great that they absorb the whole power of the engine; the back pressure on the wrong side of the piston becomes greatly increased by the fact that the exhaust steam cannot be got out of the cylinders fast enough. Eighty miles an hour, therefore, both theoretically and practically, is the limit of railway speed.

APPENDIX.

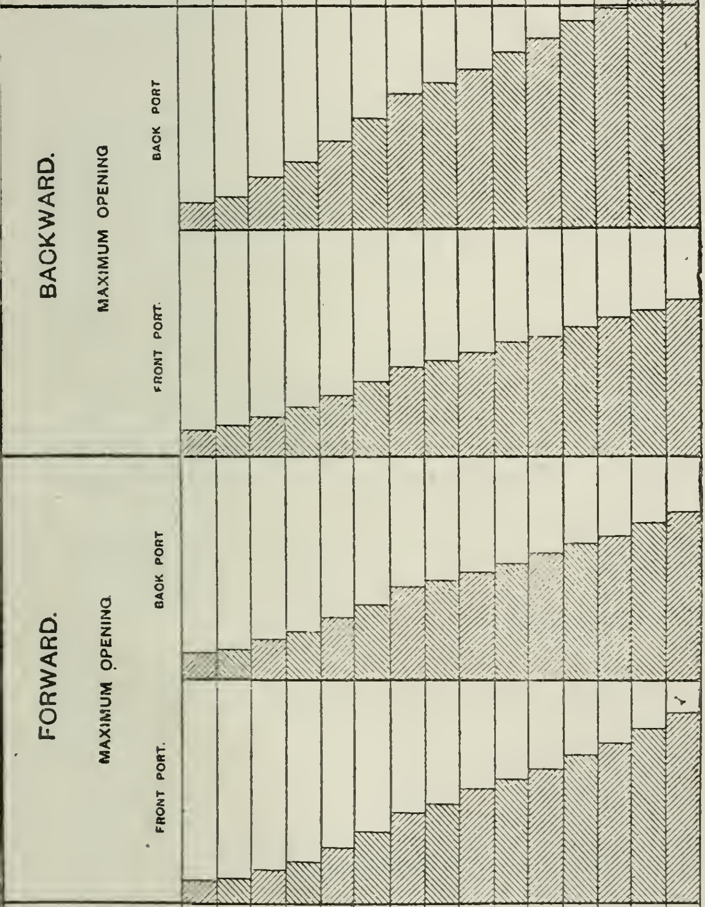
VALVE GEAR.

The well-known link-motion, almost universally employed upon locomotives, was introduced by William Howe in 1843, when he was a fitter at Messrs. Stephenson's works. Recently, the Joy valve gear has been used upon several railways, it requires no eccentrics, the valve motion being obtained from a point in the connecting rod. With the Joy gear the port opening and admission of steam depended upon the angle at which the "curved slide or quadrant" was placed by the driver by means of his reversing gear.

We now give an interesting diagram taken from the practical working of the engines themselves, showing clearly the action of the steam.

An examination of these useful figures gives the results of placing the reversing gear in fourteen positions upon either side of the centre, as shown by the "angle of quadrant," the other column gives the maximum opening of the steam ports, the percentage of the stroke at which the steam is "cut off," and the travel of the valve in inches.

It will be observed that in forward gear the action of the valve was practically equal and perfect throughout. In back gear the back port had a slightly greater "maximum opening," but this does not affect the percentage of "cut off" as shown by the almost mathematical equality which will be found to exist upon comparing the figures given in the four columns under that heading, more especially with high rates of expansion.



ANGLE OF QUADRANT	CUT OFF. PERCENTAGE. FORWARD		BACKWARD		TRAVEL	
	F.P.	B P	F.P	B.P.	FORWARD.	BACKWARD.
0°	6½	7	6½	7	2⅝″	2⅝″
3°	12½	14	15	19	2 11/16″	2 11/16″
6°	24	24	27½	31½	2 13/16″	2 15/16″
8°	33	33	36	40	2 15/16″	3⅛″
10°	42	41	44½	48	3 3/16″	3⅜″
12°	50	50	52½	55	3⅜″	3⅝″
14°	57½	57½	60	60	3⅝″	3 15/16″
15°	60½	60½	63	63	3¾″	4 1/16″
16°	63½	63½	66	65½	3 15/16″	4¼″
17°	66½	66½	69	67½	4⅛″	4½″
18°	68½	69	72	69½	4¼″	4⅝″
19°	71	72½	79½	71½	4 7/16″	4 13/16″
20°	73	75	77	73	4 11/16″	5″
21°	75	77	79	75	4 13/16″	5 3/16″
22°	77	79	81	77	5″	5⅜″

TO THE ENGINEMEN AND FIREMEN
OF THE UNITED KINGDOM.

Fellow Workmen,

The Associated Society of Locomotive Engineers and Firemen was formed eight years ago, and is making rapid strides. It was established in order to give greater security to our labour, and to prevent our employers from taking advantage of our disorganised condition. Experience has proved that we could have our grievances redressed if we were a thoroughly organised body, and thereby raise ourselves to that position to which our responsible duties entitle us. We know that men have striven for years to improve their position by appealing to superintendents and directors, with results that are but too well known, and we have only to instance the Midland dispute to illustrate our meaning. But how different might those results have been had all Enginemen and Firemen been bound in one common brotherhood, for not only is it necessary that we should prepare for sickness, old age, and death, but that we should also be afforded protection in our labour; for so great and arduous are the duties to which Enginemen and Firemen are called upon to perform, and their responsibilities so great, that the most careful men are liable to accidents, which may result in their being indicted for manslaughter. Why, then, should you pay away your hard-earned savings in obtaining legal defence, when you may belong to a Society which will provide you with legal assistance, in addition to other trade protection benefits, for the sum of fourpence per week? Surely the result of the Hexthorpe trial, in which the driver and fireman (both members of our Society) were implicated, ought to be an inducement to Enginemen and Firemen to join our Society, for we believe that had it not been for the valuable assistance rendered them by our Association, which is composed of Enginemen and Firemen only, whose interests and sympathies were identical with the accused, it would have been more difficult to have established the men's innocence, but owing to the practical experience of the officers of our Association, they were enabled to point out the imperfections of the system under which the men were working, which could not have been so lucidly explained by men unacquainted with the calling of Enginemen and Firemen. We hope you will, therefore, recognize in our Society a long-felt want supplied, and come and join us. Our Schedule of Contributions and Benefits will be found on the second page of cover of this publication.

T. G. SUNTER, *General Secretary.*

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